







The Green Thumb

A Publication of Denver Botanic Gardens

JAN. - FEB. 1963

25 CENTS



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(Extra charge for cocktails)

Program of interest to all members

DOOR PRIZES

No. 1



EDITORIAL COMMITTEE

Dr. Helen Marsh Zeiner
Editor



Members



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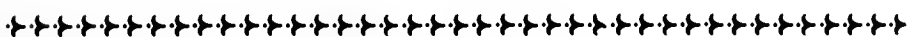


THE COVER

Shooting Star, *Dodecatheon pulchellum*

Original drawing from the
Emma A. Ervin collection

(See The Name Game for the meaning of *Dodecatheon pulchellum*)



CALENDAR of EVENTS

Every Saturday Morning — 9:10 a.m., KLZ Radio
The Green Thumb Program, Herbert Gundell, Denver County Agricultural Agent
Every Saturday Afternoon — 3:30 p.m., KLZ-TV, Channel 7
The Weekend Gardener, Herbert Gundell

*AT THE BOTANIC GARDENS HOUSE

JANUARY

- 2 — Wednesday, 7:30 p.m., Botany Club
- 3 — Thursday, 7:45 p.m., Orchid Society
- 7 — Monday, 9:30 a.m., Denver Botanic Gardens Junior Committee
- 8 — Tuesday, 12:00 noon, Mountain View Garden Club Luncheon Meeting
10:00 a.m., Herbarium Study Group
- 9 — Wednesday, 10:00 a.m., Annual Plant Sale Committee Meeting
7:30 p.m., Landscape Contractors
- 14 — Monday, 10:00 a.m., Judges' Council
- 15 — Tuesday, 1:00 p.m., Rocky Mountain African Violet Council
- 17 — Thursday, 10:00 a.m., Around the Seasons Club
- 21 — Monday, 4:00 p.m., Denver Botanic Gardens Board Meeting
- 22 — Tuesday, 7:30 p.m., Colorado Cactophiles
- 23 — Wednesday, 7:30 p.m., Landscape Contractors
- 25 — Friday, 1:00 p.m., Ikebana International Flower Arranging Class

FEBRUARY

- 1 — Friday, 12:15 p.m., Civic Garden Club Pot Luck Luncheon, Dr. Hildreth, Speaker. Board Meeting Prior to Luncheon.
- 4 — Monday, 9:30 a.m., Denver Botanic Gardens Junior Committee
- 5 — Tuesday, 12:00 noon, Mountain View Garden Club Luncheon Meeting

- 6 — Wednesday, 7:30 p.m., Botany Club
- 7 — Thursday, 7:45 p.m., Orchid Society
- 11 — Monday, 10:00 a.m., Judges' Council
- 12 — Tuesday, 10:00 a.m., Herbarium Study Group
- 13 — Wednesday, 7:30 p.m., Landscape Contractors
- 14 — Thursday, 2:00 p.m., Mountain View Garden Club Book Review
7:30 p.m., Rose Society
- 20 — Wednesday, 12:00 noon, Civic Garden Club, Division B, Luncheon
- 21 — Thursday, 10:00 a.m., Around the Seasons Club
- 22 — Friday, 1:00 p.m., Ikebana International Flower Arranging Class
- 26 — Tuesday, 7:30 p.m., Colorado Cactophiles
- 27 — Wednesday, 7:30 p.m., Landscape Contractors

MARCH

- 4 — Monday, 9:30 a.m., Denver Botanic Gardens Junior Committee
- 5 — Tuesday, 12:00 noon, Mountain View Garden Club Luncheon Meeting
- 6 — Wednesday, 7:30 p.m., Botany Club
- 7 — Thursday, 7:45 p.m., Orchid Society
- 11 — Monday, 10:00 a.m., Judges' Council
- 12 — Tuesday, 10:00 a.m., Herbarium Study Group
- 13 — Wednesday, 7:30 p.m., Landscape Contractors
- 14 — Thursday, 7:30 p.m., Rose Society

*These are all of the meetings scheduled at the time the magazine went to press.

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Notes and Notices

ANNUAL DINNER — The annual dinner of Denver Botanic Gardens will be held February 20 at 7:00 p.m. at the University Club. See advertisement on inside front cover or page 17 for details.

LIBRARY — The Helen Fowler Library at Denver Botanic Gardens has recently received a gift of 19 scrapbooks compiled by Kathryn Kalmbach. These scrapbooks contain a wealth of information collected from a variety of sources over a period of years. Among the subjects included are roses, African violets, flower arrangement, herbs, Christmas ideas, state flowers, and gardens and gardeners. You are welcome to come and browse through this wonderful collection.

The Helen Fowler Library Committee for 1963 is made up of the following persons: Mr. Fred Johnson - Chairman, Mrs. Arthur Hellriegel - Librarian, Mrs. Graham Morrison, Mrs. F. W. Ethell, Mrs. Harold Bergman, Mr. Clyde Learned, Mrs. Helen Vincent.

NURSERYMEN'S CONVENTION AND SHORT COURSE — The Nurserymen's Convention and Short Course will be held January 30 and 31 in the Student Union, Colorado State University, Fort Collins. The registration fee is \$3.50, and banquet tickets are \$3.50. Mr. Ed Scanlon, editor of *Trees*, is to be a featured speaker.

CONGRATULATIONS — To Herbert Gundell, Denver County Agricultural Agent, on the recent achievement of his daughter, Linda, who has just received one of 4 national awards in "Beautification of Home Grounds" awarded by the 4-H Service Committee at the National 4-H Club Congress in Chicago. "Herb" is now on leave from his position as Denver County Agricultural Agent and is studying towards a Master's degree at Colorado State University. His special field of interest will be turf management.

CHANGE OF ADDRESS — Please notify us as soon as possible when you change your address. This saves you delay in receiving your copy of *The Green Thumb* and saves us the expense of remailing.

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In Memoriam

M. Walter Pesman

I FIRST MET Walter as he came from Aggies College with his degree in 1910. I readily assented to write this note about my friend and former partner, but now my pen scratches and hesitates with memories of fifty years.

Walter was our regular Sunday guest. We made many mountain trips together. We were not mountain climbers, but rather plant hunters on the mountain side. I often think that Walter's great knowledge of plants roots in those trips. His charming book *Meet the Natives* is a book for every flower lover to take along on hikes, to lie on the sunny hill side and try to find the name of a new plant.

After Denver's period of very active park building was over, Walter and I opened an office in the Tramway Building. The park job continued on a part time basis, but we had a hard time pioneering landscape architecture in a pioneer city. We had work but very little income. We split up and Walter took the designing of the Denver school grounds on a monthly arrangement. Not everybody knows that the South High grounds contain an arboretum which is as complete as any in town. Skinner Junior High has a similar collection. Walter was very much imbued by Denver's need for more tree varieties and many of his efforts led to a botanical garden.

In 1924 he married Elizabeth Ann Hyde. It was a true partnership. Walter's great development began at that



time. His school planting work and lectures made him well known in Denver. He was one of the group who, some thirty years ago, met at the home of Mr. and Mrs. John Evans to start a botanical garden. We selected places but it did not happen at that time.

Walter took on the work of highway beautification and the results of this work are there today in spite of poor maintenance. Little parks near Littleton, Boulder, Pueblo, and Sterling stay alive in spite of drouth and weeds.

With his family of wife and two children — Gerald, now a consulting engineer in Grand Junction, and Josephine, Mrs. Sanford, now in Boulder — Walter and Bess had a busy time, but he grew with it. He became active in the Denver City Club, and wrote several studies for it. He was president of the club and became its active leader in civic work.

Many beautiful gardens came off Walter's drawing board and Denver is a more attractive city for his work. The botanical garden work finally bore fruit and under Mrs. Evan's leadership the tree collection in city park began. Walter's influence on this was great and when the new garden at 9th Avenue and York Street was planted he became a trustee of the garden. He was a talented teacher and his classes in Colorado University benefited many. His last book *Meet Flora Mexicana* was finished only shortly before his death.

Walter's great ability and sturdy character were bound to show in other directions. He was a humanitarian and very religious, though free from the superstition which often accompanies it. He was a member of the Unitarian Church, then trustee and finally its president for years.

As I conclude this epilogue I want to say that Denver is a better place to live in for the work of Walter Pesman and we all must be thankful for it. I will finish with a prayer, "Good night, Walter, it was worth while."

DeB.



IN RETROSPECT

M. WALTER PESMAN'S name has been linked to many projects of community betterment. These few lines, in retrospect, are written to pay tribute to his activities in conservation, forestry and horticulture.

I first met Walter at a meeting of the Denver Society of Ornamental Horticulture in 1917. He served as secretary and was a frequent contributor to its publication "Garden Hints." A meeting was held by this group in 1928 to stimulate interest in tree planting along Colorado State Highways. Walter spoke on the subject, "A Landscape Architect's Views on Highway Planting."

When this Society fell by the way side, Walter became active in the Colorado State Forestry Association. At a meeting in 1938, he discussed the subject, "Stopping Tree Waste — Facts and Needs." Shortly after he prepared articles on "Trees of Boulder, Colorado" and "Almost Anything Can Be

Made Out of Wood." These were issued by the Association as leaflets and were widely distributed.

Walter was elected President of the Forestry Association in 1943, and it was during his term that the consolidation of forestry, horticulture, gardening and landscaping interests was effected. In fact the first issue of *The Green Thumb* (February, 1944) contains a greeting from President M. Walter Pesman and the announcement of the formation of the Colorado Forestry and Horticulture Association. The name *The Green Thumb* was selected by Mr. Pesman and George Kelly, the first editor.

A review of *The Green Thumb* files reveals M. Walter Pesman as one of its most prolific authors. He was, for a long time, chairman of the editorial committee.

Do you remember the tenth anniversary program of the Colorado Forestry and Horticulture Association on

February 15, 1954? Written and acted in the form of a radio skit, it depicted events in the history of the Forestry and Horticulture Association, with a look into the future. That skit was written by M. Walter, and produced by him and Mrs. Barbour, with a whole host of actors and actresses.

This short review will show the versatility and interest of our good friend Walter in many phases of conservation, all leading to making this world a better place in which to live. We salute you, Walter! Your good works will continue to help and inspire mankind for many years to come.

F.R.J.

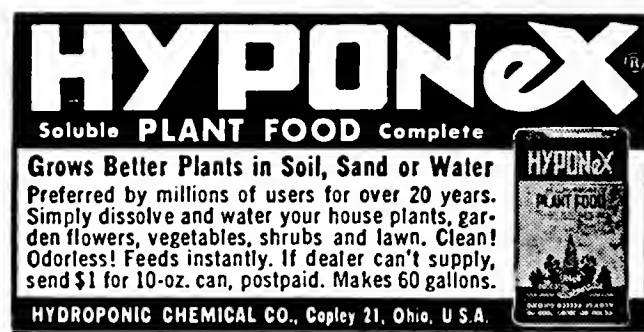
Also among Mr. Pesman's contributions to forestry were the fine drawings in *What Tree is This?* published by the City Forester's office in 1950 and now out of print.

In 1959, Mr. Pesman presented a paper before the Fifteenth International Horticultural Congress in Nice,

France, on "Little Known Ornamentals from the Land of the Rockies." Mr. Pesman represented the Colorado Forestry and Horticultural Association and the Denver Botanic Gardens at these meetings. At this time Mr. Pesman introduced the Colorado columbine to Europe by the donation of packets of columbine seed from Armin Barteldes.
(Editor)

Heigh Ho!

Plan for the Plant Sale in May! !



CONTINUED HOT WEATHER

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Dahlias

From Seeds

JEAN AND JACK FLECK

Since we prefer annuals for quick color for our flower beds, we always include seeds of dahlias in our annual seed order. These come in a great variety of types and colors, and one can choose a favorite kind.

Although we have a small backyard greenhouse where we grow our plants, there is no reason dahlias couldn't be started in the house, and placed in a sunny window after sprouting. We start our dahlia seed in small pans of milled sphagnum moss, well moistened and



pair of leaves are out. Usually by late April the weather is warm enough to plant them in an outdoor flower bed. They like full sun, good soil and lots of water.

Because the plants are already large when we set them out, it isn't long until they start to bloom, and we have masses of dahlias until frost. After cutting the flowers, we plunge the cut ends into a pan of boiling water for a second, then place the flowers in deep cool water for



placed over gentle bottom heat. They will germinate quickly. We usually start these seeds in February or early March in the greenhouse. They can be transplanted into flats as soon as the second

awhile before arranging. They should last several days if treated properly. These flowers are especially lovely for a dinner table centerpiece.

In the fall after frost we dig the tubers and store them. They will produce the same kind of lovely flowers the following year.

Aa Bb Cc's of

PLANT BREEDING

PART V

MORAS L. SHUBERT

University of Denver

THIS "PRIMER" on the principles of genetics has touched upon the major things which we, as amateur plant breeders, need to understand. While a great improvement in plant varieties can be gained through simple trial and error breeding, much more rapid successes can be obtained through the understanding and application of these principles which we have been discussing in previous chapters of this series.

When it comes right down to specific cases we are faced with the desire to save desirable traits (form, size, color, flavor, etc.) and the necessity of eradicating undesirable qualities. We must observe the plants and search the literature about species which interest us so that we will know what traits are dominant, which ones are recessive to certain other ones, and which ones can actually be blended into intermediates. We must also determine how much variation is present within the species that interests us, so that we can judge what the potentialities are in producing new combinations.

It will help make the above statements clearer if we imagine a specific example. Suppose that we have a sweet pea plant that has beautiful clear red flowers and we wish to use it as a parent for crossing with another plant that has red-purple flowers. To what

degree of accuracy can we predict the results? How many seeds must we obtain to be sure of getting all of the possible recombinations in the hybrid seed we are going to produce? The answers to these questions are of great importance if we are to follow an efficient systematic program, and not just blindly trust to luck (as we so often do). The information needed to answer the above questions will be found by our observations and reading to find answers to the following questions:

- (1) Are each of the parents homozygous (defined in Part III, page 236, August, 1962), or is one or both of them heterozygous?
- (2) To what degree do certain colors in sweet pea flowers show dominance over others?
- (3) Is there a chance that multiple factors (genes) are involved?

Actually there is a mathematical formula that can be solved to tell us how many seeds we must obtain in order to have a reasonable chance of getting all of the possible variants if we know how many heterozygous gene pairs are involved. But rather than introduce mathematics here, let us recall the problem we worked as a homework assignment (page 207) where we found that two heterozygous gene pairs crossed with two of the same kind gave

us four different phenotypes and nine different genotypes (page 236). It is easy to see that just sixteen seeds would not be enough to be sure that all of the chance combinations would be found. In our sweet pea experiment we had better cross at least a dozen flowers and save all of the seed produced for planting the next year.

It is timely now to consider some of the procedures used in cross-pollinating flowers. In a forthcoming issue, our Director of Botanic Gardens, Dr. A. C. Hildreth, will give some practical pointers based upon his many years of experience doing this sort of work. But we should first become aware of what the basic techniques are and what sources of error to guard against. In its simplest form, all we have to do in cross-breeding two plants is to make sure that the flower which is to produce the seed (the "seed parent") is protected from self-pollination or accidental cross pollination. We then apply the desired pollen to the stigma of the flower and wait for the seed to develop. This sounds very easy, and it frequently is, but sometimes there are difficulties, so we must be forewarned about these.

First we will consider the protection of the seed parent from accidental pollination. In the plants which have large flowers there is no trick to removing the stamens before they are ready to shed their pollen. If the species is commonly insect pollinated, it may be necessary to remove the petals also (or else cover the flower with a bag). An almost indispensable tool is a pair of high quality tweezers with very fine matching tips. The smaller the flower parts, the more important such a tool becomes. Since stamens ripen and shed their pollen before the flower bud opens in some species, it is frequently necessary to emasculate un-

opened buds. If wind-blown pollen is a menace, the seed flower needs to be covered with a paper bag both before and following hand pollination.

When flower parts are extremely small, it is convenient when possible to grow the plants in containers which can be set on a bench. A magnifying glass will probably have to be clamped into a good working position in such cases. An ordinary reading glass will help greatly in the tedious task of stamen removal.

There are three natural conditions that help protect the seed flower from accidental pollination. These are *self-incompatibility*, *male-sterility*, and *unisexuality*. Do these words need explaining? If so, let's take them in order. Some species have perfect flowers which produce both good ovules and good pollen, but for various reasons their own pollen will not fertilize the flower in which it is produced and frequently the whole plant may show incompatibility to its own kind of pollen. Seed production in such cases requires that pollen from another variety or strain be supplied. This fits right into our plant-breeding procedure. There are varieties of some species which just do not produce viable pollen because of abortive stamen development or for some other reason. Such kinds are said to be "male-sterile", and these make very good seed parents, provided pollen can be delivered to them at the right time. When a species is unisexual, each flower is either staminate (male) or pistillate (female). It is ordinarily easy to segregate the seed-producing flowers and protect them from pollen in these kinds.

If we have taken every precaution to protect the seed-producing flower from accidental pollen, we are ready to provide it with the pollen of the

parent we wish to use as the "male". This too requires some planning. First, will the pollen be ready for use while the pistil of the flower is still receptive? Some flowers can receive pollen only for a few hours, such as in one-day blooming species, so the pollen parent must have good ripe pollen available at the right time. It is possible to store for a few days pollen produced ahead of time, by packaging it in a clean vial and keeping it refrigerated. There are techniques for storing viable pollen for longer periods, but they are a bit too complicated for the home-gardener. In some cases it might be possible to hasten pollen development of later-blooming varieties by using techniques to force earlier blooming. This would be fairly easy in chrysanthemums, for example, by adjusting the photoperiod on late-blooming varieties to make them bloom along with earlier varieties.

Since we have talked about precautions to insure against accidental pollination of the seed parent, we must also keep guard against mixing in of foreign pollen when the pollen transfer is made. Remember that unprotected stamens could have picked up pollen from other sources.

Pollen can be transferred in numerous ways such as the use of ripe stamens when they are large enough to handle, whole flowers (but if they have been in bloom for several days, they may be contaminated by other varieties of pollen), and the use of a small camel's hair brush. Do not forget that a brush can also carry unwanted pollen, so several such brushes should be used so that each can be thoroughly washed, preferably in alcohol, after each use.

How about records of our work? It is extremely important that very complete and accurate records be kept

if we are to accomplish worthwhile results. A notebook should be kept and the pedigree of every parental variety should be carefully entered under an appropriate identifying number code. If one is working with several species of plants, it will save effort in the long run to assign a number or letter to each species and then some sort of serial number to each individual variety. Every cross should then show by code number which two were crossed, for example sp-113 x sp-97 would show which two sweet peas were crossed. Information about the weather and date should be entered, and later it might be worth writing in what the seed yield was.

At first it might seem that such records are just busy-work, but if further breeding is to be done with the progeny of earlier crosses, it becomes increasingly important to follow a "pedigree" system. It is also embarrassing to get an interesting hybrid and later be unable to tell your fellow gardeners what the parentage of it is!

This concludes my present contribution to this interesting subject, but as will become quickly apparent to those who become involved with plant-breeding, we have only "scratched the surface." Basic principles given here can only provide a starting point, and it is hoped that many will be excited enough by the prospects to wish to do further study. It might even be that a study group should be organized where ideas could be exchanged. Those interested in organizing an informal research group should address a card to Botanic Gardens House. If enough interest is shown to make it worth doing, you will be invited to participate. I would recommend that tax-deductible dues be paid and that the money be used to purchase microscopic equipment for our future botanic gardens laboratories.

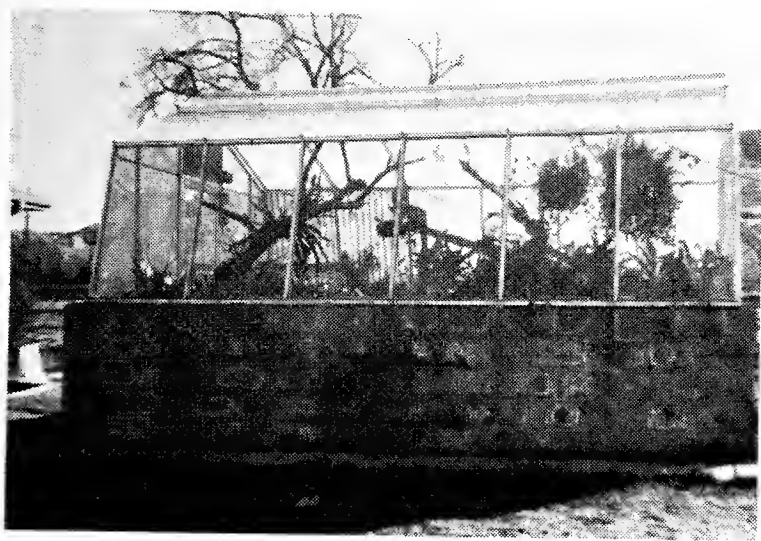
Greenhouse...

What and Why?

EUGENE C. LARR

THIS TITLE may seem rather strange and yet by answering these two simple questions a great deal of understanding may be forthcoming.

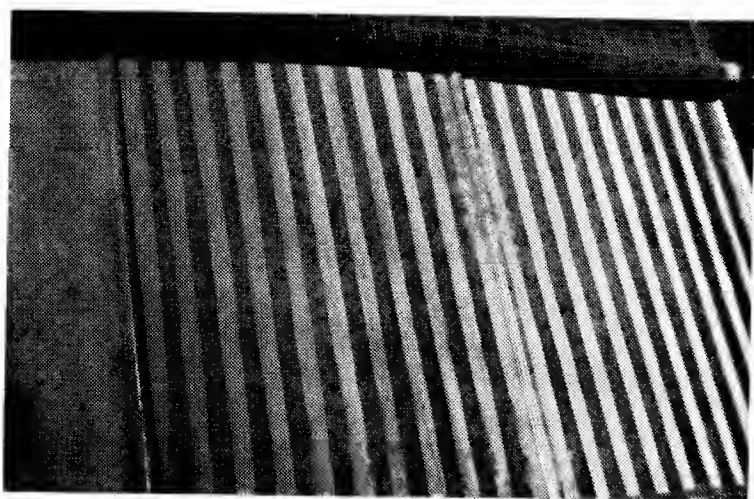
First of all, WHAT? Generally speaking, a greenhouse is everything



North side of greenhouse. Notice that no shading is used.

else but green. If one were to pick a descriptive color it would be a white-house, for certainly the great majority of these glass or plastic structures have been tinted with many of the various white pigments to reduce the sun's intensity. It is obvious, then, that the greenhouse must refer to what is inside, for truly here the year around is a frost-free sanctuary in which green is the dominant color. Inside this glass or plastic room, with a few modern contrivances temperature, humidity and light can be completely controlled so that the owner will have at his disposal a perpetual spring, with all of the blooming and growing plants that this word connotes.

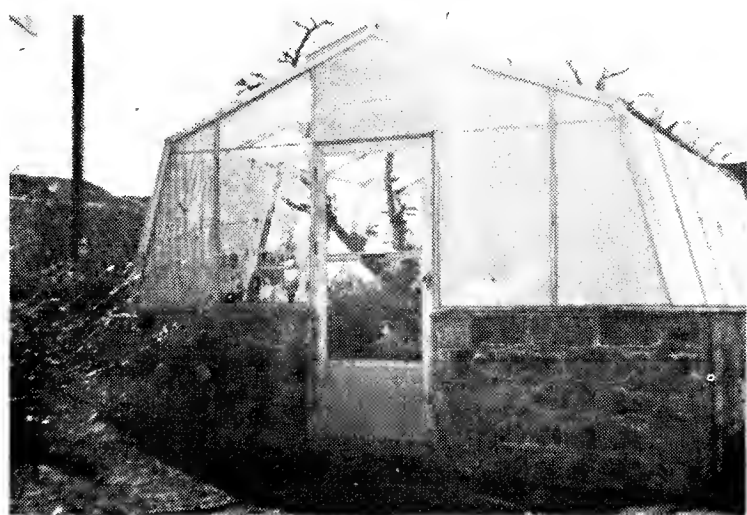
A few brief thoughts should be given to the structure itself. My particular greenhouse is 14' x 16' x 10' high, so we will use this as a scale. The frame can be wood or metal (usually aluminum). Into this frame is laid, by various techniques, sheets of glass or plastic. Because of our cold Denver winters it has been suggested that plastic is the better material because of its greater ability to retain heat in the greenhouse. An additional disadvantage of glass is damage which can be caused by hail storms. (This can be reduced to a minimum by covering the structure with a fine wire mesh.) Regardless of the material used, there must be some type of coating to cut down the intense direct sunlight. Many plastics are manufactured with a white pigmentation that often requires little or no additional paint. Glass, however, must be painted with some material to render it opaque to direct sunlight. (These coatings should be so ad-



Southeast corner showing three types of shading: white paint, white paint overlain by sprayed on aluminum paint stripes, rolled bamboo shading.

justed as to give the light intensity required for the particular variety of plants in which you are interested.) The percentage of light admitted to the greenhouse can be easily measured with a standard light meter.

The interior decor or finish of the greenhouse walls or floors can be left completely to your imagination. Some prefer cast solid cement floors. Others prefer brick or tile, while I prefer a 4" layer of coarse gravel laid over heavy polyethylene sheets.



East end showing door and immediately above it the hot air exhaust port.

Two of the most important conditions to control are heating and cooling. The heating is easily carried out by any of the various commercially-made greenhouse heaters. Again, in my case a 30,000 B.T.U. heater is placed off center in the 14' wall, so that its hot air circulating fan gives a gentle circular motion to the warming air inside the greenhouse. The cooling is carried out by a desert air evaporative cooler situated near the heater. The size of this unit is best determined by your particular problem and the type of plants you grow. In the Denver area, where the humidity can be so unbelievably low, I have found it necessary to keep the standard top and side vents of the greenhouse tightly closed at all times. At one end near the roof I have a small opening which allows hot air

to leave the greenhouse through a flapping door only when the evaporative air cooler is turned on. Both of these units, the heater and cooler, are controlled by Minneapolis-Honeywell thermostats.

Another most important control necessary in a greenhouse is humidity. This is best controlled by elaborate humidity control systems. Since this can be expensive, adequate control can be maintained by two simple means: 1. Thoroughly wetting down the greenhouse floors, walls and benches each morning. 2. By the introduction of a fine fog spray-head under the benches. The head I use is similar to the one generally seen in vegetable markets to maintain a fine fog over the fresh leafy vegetables.

Let's get down to some case histories. My greenhouse is completely devoted to the culture of the so-called botanical orchids. (Botanical orchid in this case refers to actual species and subvarieties which have undergone no hybridization. Generally speaking, the flowers are small but of fantastic color and shape.) My collection of nearly 1,000 plants gives me many unusual flowers at all times of the year.

From what I have said above let us adjust the greenhouse. The total light allowed in the greenhouse at high noon



Interior view showing orchid plants.

and full sunlight is 72% total solar luminosity. We will adjust our heating control for a minimum temperature of 57°F. The cooling controls for the evaporative control are set at 85°F. (On our very hottest days even with this setting the greenhouse will sometimes reach a maximum temperature of 95°F.) The humidity, which is controlled by spray nozzles and manual watering, is kept above 75% if at all possible. These humidity requirements are sometimes difficult to maintain, but well worth it from a standpoint of cultural success.

Now that we have gone through most



Southeast corner showing heater in east wall and evaporative cooler in south wall.

of "what is a greenhouse?" I am sure you must be wondering what kind of a price tag is placed on such an interesting structure. Expense can range from a few hundred dollars to several thousand dollars, depending on how much of the work you do yourself and how large a structure you would like to build. My greenhouse as it sets today, with its aluminum frame supporting painted glass, its concrete block wall, its heater, cooler and controls, represents an investment of approximately \$1,500.00. The structure could be built for a quarter of this figure if one would be able to spend more of his own time in the initial construction.

Now after this long and complex description we ask the important question of, WHY?, and we will answer it in three ways:

1. The culture of plants under greenhouse conditions is one of the most rewarding and satisfying hobbies that one can pursue.
2. There is no limit to what you can do with plants in a greenhouse, except your own lack of imagination.
3. It's one whale of a lot of fun!



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Exotics of Colorado

THE SILVER MAPLE

HELEN MARSH ZEINER

ONE OF THE most common shade trees in towns and cities throughout Colorado and other parts of the great plains region is the silver maple or soft maple, *Acer saccharinum*. This tree is so familiar that very few persons are aware that *Acer saccharinum* is not native to the area. It is native to the eastern half of the United States and adjacent Canada, but it is strictly an exotic in the great plains area where it has been so extensively planted. In its natural habitat, silver maple is found in wet or moist places, such as river bottoms, overflow lands, or old sloughs. It may form the principal stand in such areas, but is often found growing in combination with willows, birches, or the sycamore. Common names such as river maple or swamp maple indicate its natural habitat.

Because it is a handsome tree, silver maple has been planted as a shade tree in all parts of the United States. The opposite leaves are deeply lobed and irregularly toothed, silvery beneath, turning yellow in the fall. Horticultural varieties with very deeply cut leaves have been developed. Some of these are so deeply cut that the leaf is almost a skeleton, giving a lacey appearance to the foliage. The bark is gray, thin and smooth on young trees, in long thin scales on old trees. The flowers are interesting but inconspicuous. They appear very early in the spring before the leaves open, and are followed by the typical maple samara or "key" fruit.

The tree is well-shaped, rounded to spreading, and is attractive during the winter when the handsome foliage is gone.

In addition to being a widely used shade tree, silver maple has had many



other uses. In this region it has been used as a shelter belt tree, but since it needs water, there are other trees better for this purpose. The name soft maple refers to the wood, and is the name commonly used in the lumber industry. Among the many uses for the wood are boxes, crates, spools, and even furniture. Sugar can be made from this

maple, but a given quantity of sap will yield only about half as much sugar as that of sugar maple.

In the eastern half of the United States, a silver maple cultivated as a shade tree may attain great size and live to a very ripe old age. The author is familiar with one such tree which was topped when known to be 75 years old. Sixty feet was removed from the top of this majestic tree and the remainder was still higher than the adjoining two-story houses. This tree was topped to prevent possible wind damage to these houses, since the tree was known to be old. The circumference of this tree is so great that a man could not possibly reach around it. Ten years after the topping, this maple was in good condition and appeared to be good for many more years of life. Silver maples of this size are somewhat the exception, but they are generally large in their native habitats.

In the plains area they are medium to large trees, reaching heights of fifty to seventy feet. In this location they have a life span of about seventy years. Since the silver maple is a native of wet habitats, it needs irrigation to do

well. Where it can be artificially watered, silver maple can be a very useful tree. Its growth rate is medium to fast, and it will tolerate the climate of the great plains. It is sensitive to alkaline soils, and may develop chlorosis. Applications of nitrogen and iron sulfate can be used to prevent or control this condition. The tree is relatively resistant to disease and insect damage. The wood is soft and somewhat subject to decay, and the branches are rather brittle and subject to breakage in snows which fall while the leaves are still on. There have been some complaints of roots clogging drain pipes—this should be considered in locating the tree. Young trees should have the trunk wrapped or shaded to prevent sunscald.

While not one of the most superior trees for this area, silver maple is nevertheless a very useful tree which has been a boon for many years to the great plains region. The shady oasis of the little plains town has been largely due to this adaptable exotic. Look on it with respect and appreciation—it has done much to make “the great American desert” a pleasant place in which to live.

Annual Dinner

THE DATE for the Denver Botanic Gardens annual dinner has been set for Wednesday, February 20, at the University Club, 17th and Sherman streets. We hope to have an important announcement in the near future (perhaps before this issue appears) that will make the program for this meeting very exciting.

The annual dinner is open to members of the Denver Botanic Gardens and their friends and to anyone else interested in attending. In addition to

enjoying a fine meal, you will have the opportunity of meeting other members of the organization, and to find out what has been done this past year and what is being planned for the future.

Since space is limited, we urge you to buy your tickets early in order to avoid disappointment. Tickets may be purchased at Botanic Gardens House. (See advertisement on inside front cover.)

Watch for the Garden Show issue in March





D

WINTER INJURY to TREES and SHRUBS - Denver Area

GEORGE S. STADLER, *City Forester*

VARIOUS TYPES of injuries may occur to woody plants when their growing parts are affected by sudden fluctuations or extremes of winter weather. Certain physiological limitations exist which cannot be exceeded without a resultant damage to living plant tissues. Different species, varieties, and even individuals are endowed with inherent abilities to endure conditions of winter weather. However, by means of protection and with an adaptation and modification of growing loca-



E



F



G



H

tion, a woody plant not ordinarily considered winter hardy may survive difficult winter weather.

Winter hardiness and freedom from winter injury are influenced by location, natural or man-effected protection, drainage, soil, and other environmental factors, as well as by genetic characteristics of the woody plant itself. Causes and effects of winter injury, therefore, should be evaluated on a how, when, where, and why reasoning. Generally, any tree or shrub growth if totally dormant is in its best condition to undergo

Key to photos on pages 18-19

A-D — Storm, September 9, 1959.

E — Winter sunscald injury on trunk of American linden tree.

F — Winter sunscald injury on trunk of small English elm tree.

G — Winter sunscald injury on trunk of flowering crabapple tree.

H — Winter sunscald injury at base of small tree.

Photos courtesy City Forester's Office

winter weather extremes. Any woody plant not in this state is usually vulnerable to winter damages in one form or another.

Factors which contribute to tree and shrub winter injury susceptibility are:

- (1) Presence of excessive water, or absence of adequate moisture in the soil surrounding the root system.
- (2) Absence of snow or protective mulch cover on the surface of the ground over the root system.
- (3) Use of fertilizers late in the growing season which result in late succulent growth.

Results of winter injury usually become very apparent during the growing season following the time of actual damage. Injuries to foliage, flowers,

and fruit, while still in the incipient bud stage, become readily apparent as the growing season progresses. When damaged tissues fail in their necessary functions during this period, dead or dying buds, twigs, and branches develop. Dead bark and cambium sections will become evident in patches or strips. Brown colored needles, or needles with scorched tips on evergreens serve to emphasize earlier injury during the winter period. Damages to roots may not become too evident until hot weather occurs and then wilting or marginal drying of foliage indicates that the injured root system is unable to offset evaporation losses.

Spring growth interrupted by late freezes is subject to varying degrees of damage in overly succulent tissues. Likewise failure to complete the annual growth cycle in time to avert a fall freeze can result in tissue injury. Occasionally unseasonably warm "Indian Summer" weather prevailing into the late fall will result in a late stimulation of growth. Such trees and shrubs become very subject to damage by sudden low temperatures. The so called "winter sun scald" which happens to tender barked trunks and branches after exposure to direct rays of winter sunlight is a specific result of this type of winter injury. Certain trees and shrubs with shallow root systems in frozen soil, can be seriously damaged when exposed to winds of low humidity. Frost cracks may result following certain extremes of temperature variation. If moisture is reduced in portions of sapwood tissues to cause unequal stresses, longitudinal separations of bark and wood occur.

Since winter injury results from many factors beyond human control, precautions recommended for preven-

Watch for the Garden Show issue in March

tion are definitely limited. Serious injury and resultant high mortality occurs to newly planted trees in recently developed home areas and similar locations of exposure. In such locations, only proven hardy planting stock can be depended on, and planting sites should be selected or prepared in such a manner that water drainage and good soil aeration prevail. Here the wrapping of deciduous tree trunks and shielding of shrub and evergreen plantings from exposure and direct rays of the winter sun is recommended. Care taken to maintain soil moisture in an adequate manner, but not to excess, is imperative. Mulching of ground surfaces may prove beneficial. However, improper application of mulches results in more harm than benefit. Qualified use of anti-dessicant coatings to reduce evaporation loss can also prove advantageous to prevent needle burn and dessication of evergreen plantings.

Older established trees, whose growth has been adjusted to their environment, present somewhat different problems. Precautionary measures for protection of such trees should give consideration to the extended nature of their established growth. Soil moisture and aeration needs can be vitally important. Lawn irrigation may be adequate for the summer months, but extremes of dry weather during late fall and winter periods can require supplemental irrigation if unfrozen soils prevail. This reasoning particularly applies to shallow rooted evergreens in exposed locations. Drainage of excessive soil moisture may be difficult to correct, other than refraining from irrigation during periods when rainfall is adequate. Soil aeration in compacted soils may be improved by mechanically or hydraulically perforating openings through relatively impervious or tight soils. This should be done in a manner

which will allow for percolation downward of soil moisture carrying particles of air into feeder root zones. Excessive drying which might result from such openings can be prevented by loosely filling them with peat moss or coarse sand.

If and when winter injury does happen, dead limbs and bark tissues should be properly removed during the following growing period and proper wound treatment applied. Dead or dying winter injured tissues and their usual effect in reducing vigor of growth, can allow agents of disease to move in and become established. Such infections complicate normal tissue healing and thereby cause further damage to winter injured trees and shrubs. Excessive pruning should generally be avoided. Need for spring fertilization may or may not be desirable, depending upon the species and vigor of the tree involved, the nature and severity of the winter injury, and the presence or absence of symptoms of disease.

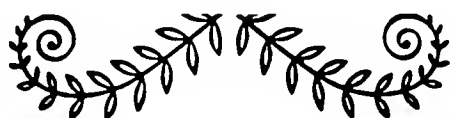
Mechanical injury and snow breakage during the dormant period is seldom very serious in the Denver area. Occasionally heavy snowfalls may effect injury to unstaked seedlings or saplings, or possibly weight down branches of evergreens. Proper pruning, shearing or bracing of such plants during growing periods in anticipation of such a possibility is recommended. Sliding snow from steeply sloped roof tops and frozen gutter drip from partially clogged gutters may cause considerable damage to those plantings directly underneath. Such conditions can usually be foreseen at the time of planting and thereby possibilities of this type of damage can be averted.

Unseasonable heavy snowfall in the early fall or very late spring periods, while deciduous trees are in full leaf, can, however, be devastating — parti-

cularly to out-of-proportion and over-stimulated growths with weak structure. Timely structural maintenance of growing trees and proper pruning performed by qualified arboricultural experts can greatly reduce severity of this type of snow damage.

In summation, it might be said that varying forms and degrees of winter in-

jury can and do occur to woody plants in the Denver area. The selection of hardy growing stock and appropriate growing locations are basic preventive measures. Also, a continuous care program which will recognize the ever-changing requirements of a growing tree or shrub over its entire lifetime is considered a necessity for survival.



South African Amaryllis

KATHARINE B. CRISP

THIS PLANT grows from a bulb producing huge flowering spikes almost on schedule. Year after year the amaryllis can be kept blooming with a minimum amount of effort and it can be timed to flower when wished.

When the blooming period is over the plant should be kept growing indoors by keeping the soil moist and adding plant food at intervals.

After the last frost is past in the spring, the plant should be placed in a semi-shaded spot in the garden with the top of the pot about one inch below ground level. In the fall, just before the first frost, bring the pot indoors and store it perfectly dry in a cool place. When the foliage turns yellow cut off the leaves. Leave the pot dry and undisturbed for two months.

Following this resting period bring the pot into the light and warm air again. The growing cycle will repeat itself once more. Large beautiful flowers will appear to brighten the indoors during the dead of winter.



Photo courtesy of Jackson & Perkins, Newark, New York

That WILTING Russian Olive Tree

EARL J. SINNAMON

President, Swingle Tree Surgeons, Inc.

THE RUSSIAN OLIVE, or better known to botanists as *Elaeagnus angustifolia*, is widely planted in the Denver area. Many have escaped to the wilderness and are found along streams and roadways, where they seem to be well adapted, and so suited to the location that they are an aid in beautifying the landscape. Their usefulness is as an artistic tree with contrasting foliage and for large rapid-growing hedges.

Unfortunately, the Russian olive has not escaped "the Pandora Box" of diseases and troubles that afflict this old world. The Russian olive has sudden spells of wilting, occurring usually in late summer when the weather is hot and the ground dry. We have investigated many of these conditions and have come to three conclusions:

In some instances of sudden wilting of the Russian olive during the summer — usually in August — a few trees have shown severe wilting over the entire tree and others only on certain branches. A close examination has failed to reveal any indication of a diseased condition. This is what we call "a physiological disturbance," meaning we do not know the answer. Our conclusion is that the tree has made an exceedingly rapid growth and occasionally, during periods of dry weather, the shallow root system is unable to support the heavy crown of foliage and the result is wilting. Ordinarily by the next season the tree has recovered satisfactorily. Careful pruning to re-establish the balance between the crown and

root system helps to correct this situation.

In the second and third conclusions two diseases are involved — Verticillium wilt and Phytophthora canker. Casual organisms of both have been isolated from Russian olive.

The Phytophthora canker usually occurs at ground level, working underneath the bark and killing the phloem tissue, which results in the stoppage of plant food being translocated to the root system. This obstruction causes an accumulation of a large, brown, jellylike substance on the trunk of the tree. If the tree is badly diseased the jellylike substance will develop all around the trunk, but if the canker is confined to one side of the tree the substance will accumulate above that area. In cases where the canker has not become too widespread, we have obtained control by removing the diseased area and then disinfecting and painting the wound, also digging around the collar of the tree and backfilling with fine gravel or sand to promote drainage. It has been our experience that if the disease has not become too progressive the tree can be saved.

The Verticillium wilt attacks not only the Russian olive, but many species of trees — especially the maple. The most common indication of the presence of the disease is a discolored streaking or stain in the tissue underneath the bark. The extent of injury varies; in some cases the entire tree is

killed but often damage is confined to a few branches. Treatment of affected trees has many and varied recommendations. Some plant pathologists believe feeding the tree heavily is the answer. Their thinking is that it might outgrow the wilt. Others do not recommend feeding as they believe the added nitrogen causes increased activity of the *Verticillium* fungus and results in

a more rapid decline of the tree. Our own observations have been that feeding seems to be helpful to the tree. Removal of the diseased branches is also helpful.

There are, no doubt, many other causes of the wilting Russian olive trees, but our experience has proven these to be the most common in this area.

Marigolds

A. C. HILDRETH

Director, Denver Botanic Gardens

THE NAME "marigold" has been applied to two different members of the sunflower family, *Calendula* and *Tagetes*. When Shakespeare wrote about "marygolds" he meant the former, *Calendula officinalis*. This plant is native in southern Europe and the Near East and was cultivated long before the discovery of America. In past centuries it was valued for its medicinal properties. It was employed also in cookery as a salad plant and as a pot herb, from which latter use its common name "pot marigold" was derived. The present tendency is to drop the name pot marigold and to use instead the botanical name *Calendula* as the common name.

To modern gardeners, "marigold" means the genus *Tagetes*. These plants are native only in the western hemisphere and the 30 or more species are naturally distributed from Arizona and New Mexico to Argentina. Most of them are annuals but a few are perennial. Only a few species are in cultivation.

Padres of the Cortez expedition in Mexico are said to have sent seed of

Tagetes to Spain. From there seed was distributed to monastery gardens in France and north Africa during the latter part of the 16th century. Garden forms developed. These spread gradually throughout the eastern hemisphere and were reintroduced into the Americas.

From the early distributions of *Tagetes* in the old world, two distinct types of cultivated marigolds evolved:

(1). AFRICAN MARIGOLDS. The tall marigolds were developed in African gardens from the Mexican species *Tagetes erecta*. They have been known as African Marigolds for so long a time that they have come to be regarded by many horticulturists as native to Africa. In order to correctly identify these marigolds with their source, they have been called "Aztec Marigolds" by some recent authors. One prominent seedsman uses the name "American Marigolds" for this type.

(2). FRENCH MARIGOLDS. In the gardens of France were developed dwarf marigolds, typically not more than a foot high. Although commonly called "French Marigolds," these were

derived from the Mexican species *Tagetes patula*. French marigolds are often listed in catalogs as "French Tagetes." This has led some amateurs to the erroneous belief that the name "Tagetes" applies only to the French or dwarf type and that *Tagetes* and marigolds are different. Of course, all marigolds, whether tall or dwarf, are properly called *Tagetes* because all belong to that genus.

A third type of marigold has recently attained some prominence. Collectively its varieties are called "MEXICAN MARIGOLDS." They have been called also "STRIPED MARIGOLDS" because of the deep orange stripe running down the middle of each petal in the wild form. This characteristic, however, is lacking in some of the cultivated varieties. These marigolds have been called also "SCOTCH MARIGOLDS" for no good reason.

Marigolds of this type are derived from the Mexican species *Tagetes tenuifolia*. The dwarf form, *pumila*, is the one in cultivation. Botanists formerly called this plant *Tagetes signata pumila* and it is still listed under this name in most seed catalogs. By whatever name, it is a gem of a plant for low edgings or for rock gardens. It forms a neat, low mound. The foliage is finely divided and the tiny flowers are single, star-shaped and yellow or orange in color.

For centuries the so-called French and African marigolds remained distinct. In recent years, however, plant breeders succeeded in crossing the two types. The resulting hybrids are intermediate between the two parents in height and in certain other characteristics. We may expect such cross-breeding to continue with interesting results for gardeners. Perhaps other species not presently cultivated will be interbred with garden forms to add greater variety.



A Brownie Girl Scout with her namesake flower, the Brownie Scout Marigold.

Photo courtesy of National News Bureau, Girl Scouts of the U.S.A.

Much other breeding work has been undertaken to improve marigolds. About a quarter of a century ago the first "odorless" marigold, 'Crown of Gold' was introduced. Others with odorless foliage are now available. Marigolds with sweet-scented flowers have also been developed.

For many years the W. Atlee Burpee Company, Seed Growers, have been searching for a pure white marigold. They offer a prize of \$10,000 to the first person who furnishes them seed of such a marigold with a flower 2½ inches or more across. Special awards of \$100 each have been granted to several people who have made significant progress toward developing a white

marigold but thus far only pale yellow ones have been produced.

Among garden annuals in the United States marigolds rank third in popularity. They are grown also in most other parts of the world, especially in hot climates. During the last two decades, more than 100 varieties have been offered in the trade. These represent a range in height from 6 inches to 3½ feet and a wide variety of flower forms, sizes and colors. There is now a marigold for almost every garden purpose—low edgings, tall background plantings, beds, borders, rock gardens, planters, pots, window boxes and cutting beds.

MARIGOLD TRIALS IN 1962

In 1962 the Denver Botanic Gardens began trials of marigolds to determine what varieties are best adapted and most effective for garden planting in the Denver area. The plants were started in the greenhouse and were transplanted to test plots in the trial garden after danger of frost was past. Fifty plants of a variety constituted a test plot.

After eliminating mixtures, duplications and plots which for one reason or another had an insufficient number of plants for an adequate test, 67 varieties remained for consideration in the final judging. Varieties were evaluated on their performance in the garden and on their landscape effect rather than on their merit as cut flowers.

Horticultural books and seed catalogs show that several attempts have been made at classifying marigold varieties. Some classifications are based on botanical relationships. Others are based on plant or flower characters, such as height, ill-scented or odorless leaves, flower color, single or double flowers and carnation, chrysanthemum or crested flower types.

The first thing a gardener wants to know about a marigold is its height. In reporting results of the 1962 trials, therefore, height has been the basis of the first grouping. In considering height, however, one should remember that our high-altitude sunlight has more ultra-violet rays than that of lower elevations and that strong ultra-violet light shortens plant growth. Consequently, our plants tend to be shorter than in most other parts of the country and our records on marigold heights may not agree with those in seed catalogs.

Flower color is the next concern of the gardener and this is the basis of the second grouping of varieties. Final grouping of the dwarfs and the variegated tall ones is on the basis of single or double flowers.

Only varieties judged worthy of planting in the Denver area are included in this report. These are listed under each final group in the order of their desirability, the best being first.

TALL MARIGOLDS (18 inches or more)

YELLOW: Yellow Climax, Yellow Fluffy, Mary Helen, Mammoth Mum (also known as Yellow Mammoth Mum), Mr. Sam

GOLD: Golden Mammoth Mum, Goldsmith, Golden Climax

The marigold, third most popular annual in the United States.
Bodger Photo



ORANGE: Toreador, Frills, Orange Glow, Super Chief

VARIEGATED: Double: Red and Gold Hybrid (red and yellow)
Single: Flash (red and orange)

DWARF MARIGOLDS (less than 18 inches)

YELLOW: Double: Cupid Yellow, Petite Yellow, Butterball, Lemon Drop, Primrose

Single: Lulu, Goldilocks, (*Tagetes tenuifolia* type)

GOLD: Double: Petite Gold, Spun Gold

ORANGE: Double: Tangerine, Sun-kist, Petite Orange

Single: Ursula (*Tagetes tenuifolia* type)

VARIEGATED: Double: Ball Dwarf Harmony, Firetail, Red Head, Helen Chapman, Harmony, Brownie Scout

Single: Naughty Marietta

Results of one year's trial of any kind of flower are not considered conclusive. These marigold trials, therefore, will be repeated during 1963 and new varieties will be added.

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LEE CHAMBERS

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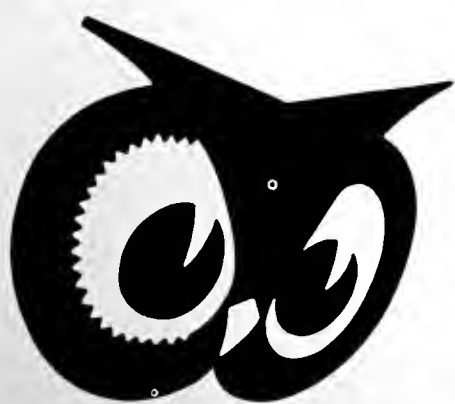


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T · H · E N A M E M. WALTER PESMAN G · A · M · E

KNOWING JUST a few common adjectives in Latin makes it easy to understand why the original botanist applied them to certain plants. *Spectabilis*, *speciosa*, *pulchellum* and *pulcherrimum* all indicate beauty. No wonder poinsettia is called *Euphorbia pulcherrima*, and the high-altitude Jacob's ladder, *Polemonium pulcherrimum*. Milkweed is *Asclepias speciosa* and bleeding heart is *Dicentra spectabilis*.

Dodecatheon pulchellum is especially favored in its name. This shooting star commemorates the twelve gods (*dodeca-theon*) and its beauty (*pulchellum*).

Vulgaris (common) occurs in *Syringa vulgaris*, the common lilac, and in English privet, *Ligustrum vulgare*.

Officinalis is found so often in European plant names that it might be in-

terpreted as "common" as well; in reality it means used medicinally, as *Levisticum officinale*, *Veronica officinalis*, *Primula officinalis*, *Lithospermum officinale*, and — believe it or not — *Taraxacum officinale* (the common dandelion).

Cultivated plants often take the name *sativus*, like *Pisum sativum* (pea), *Cucumis sativus* (cucumber) and *Raphanus sativus* (radish).

According to the natural habitat of plants we get such names as *Juniperus scopulorum*, of the mountains, *Erigeron salsuginosus*, in brackish places, *Viola palustris*, in swamps, *Veronica rupestris*, of the rocks, and *Cerastium arvense*, of the field. *Petrophila* means rock-loving as in *Salix petrophila*, the alpine willow.

Among odds-and-ends: *Rhus toxicodendron* means poison-leaf, appropriate for poison ivy. *Arborescens* simply means tree-like as in *Caragana*. P.S. Botanists have many names for hairiness; do you know them? Look in the next issue of *The Green Thumb*.

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Catalogue Offerings for 1963

MRS. F. C. VETTING

IN THINKING ABOUT new varieties for 1963 one should not overlook or forget those that were last year's favorites. Some of you will want them in your garden for years to come. Most people like something new but also have a very warm feeling toward the old varieties — "the tried and true."

In selecting new varieties, you will find that each seed grower gives information about new varieties in the garden and stresses the ones that he believes will be accepted by the public. Remember that not all of these will be successful in our climate, but all are worth trying. Among the varieties offered in the 1963 catalogues are the following:

Achimenes — *Crimson Tiger*, sparkling crimson-rose with golden throat. Double flowers in profusion on dense 9"-plant mounds. George W. Park Seed Co., Greenwood, South Carolina.

Asters — *Radiance*, scarlet-rose, semi-quilled flowers about 4 inches across. It blooms from early summer until frost. W. Atlee Burpee Co., Philadelphia 32, Pennsylvania. *Early Charm*, very early with fine, long, clean stems and well-formed flowers. It comes in blue, crimson, rose, peach blossom, and white. Denholm Seed Co., 2342 Sawtelle Blvd., Los Angeles, California.

Canna — *Seven Dwarfs, Happy*, a primrose-yellow. George W. Park Seed Co.

Geranium — *Little Read's*, very dwarf, bushy plants in color range through scarlet, orange, salmon, rose, pink, white, and lavender. George W. Park Seed Co.

Impatiens — *Tangerine*, a warm and glowing golden tangerine. George W. Park Seed Co.

The Rose, a double-flowered pure pink. George W. Park Seed Co.

Kalanchoe — *Pastel Hybrids*, many shades and tones of salmon pink, rose, red, and yellow. George W. Park Seed Co.

Larkspurs — *Imperial White Swan*, a pure white, fully double 2-inch flowers on well-formed straight spikes. W. Atlee Burpee Co.

Flaming Larkspur, a full, deep salmon flower about 2 inches wide. W. Atlee Burpee Co.

Imperial Type, a bright lilac shade, William Zvolanek and Co., Lompac, California.

Marigolds — *Orange Glow*, an orange chrysanthemum-type flower. The 4-inch flowers grow profusely on 2½ foot plants. W. Atlee Burpee Co.

Penn State, a round, fluffy, chrysanthemum-type flower, 3½ inches wide, in a golden yellow color. W. Atlee Burpee Co.

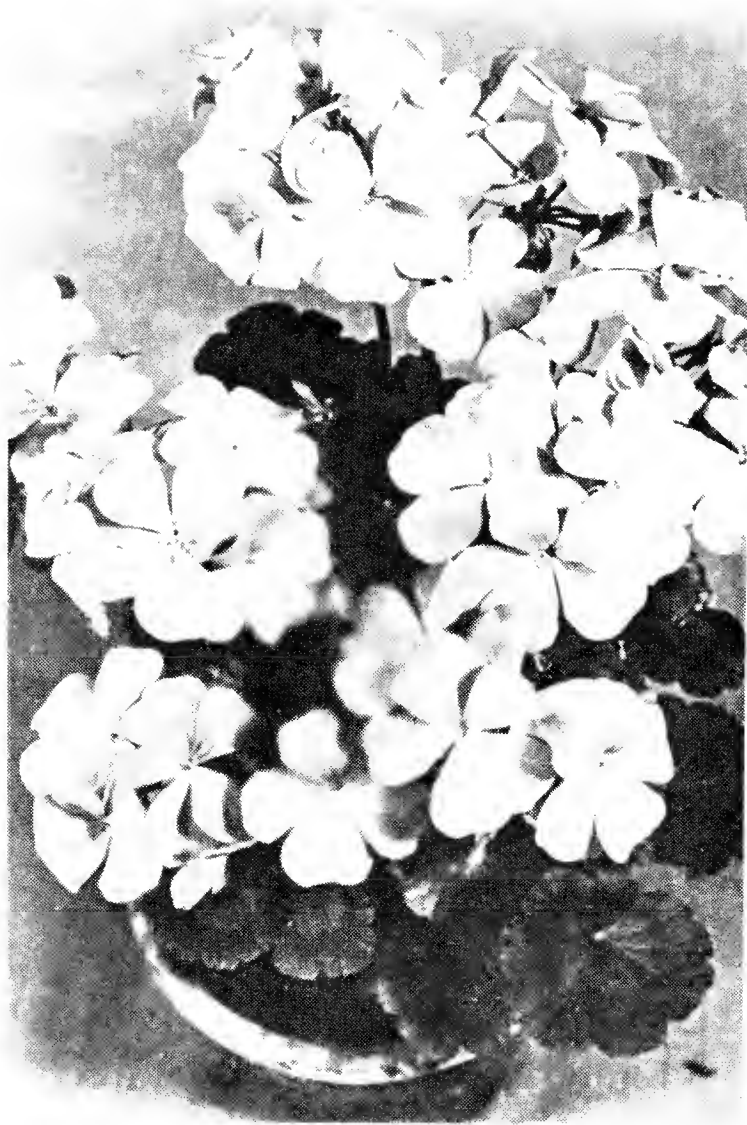
Pentstemons — *Prairie Dusk* and *Prairie Fire*, hardy pentstemons developed by Glenn Viehmeyer of North Platte, Nebraska. George W. Park Seed Co.

Double Achimenes.

Impatiens The Rose.

Photos courtesy George W. Park Seed Co.





Dwarf Geranium, Little Read's.

Photo courtesy George W. Park Seed Co.

Petunias — *Honey Bunch*, a soft rich salmon pink. The mound-shaped plants bloom well in planters, flower boxes, and gardens. Developed by Pan-American Seed Co., Paonia, Colorado.

Snowbird, a pure white double multiflora. It is excellent for patios or gardens that are used at night, as the glow lasts as long as there is light. Pan-American Seed Co.

Red Cascade, said to be the brightest red grandiflora yet produced. It is a profuse bloomer and is unexcelled for use on sloping banks or low garden walks. Pan-American Seed Co.

White Cascade, well adapted for beds and borders. Its pure white flowers are very large. Pan-American Seed Co.

Fandango, a rich violet blue-and-white bicolor. The compact plants spread and are free-blooming, with large flowers making them ideal for borders. Pan-American Seed Co.

Pink Cascade, a rose-pink color with light yellow throat. It is a large and free-flowering early bloomer. Pan-American Seed Co.

Cardinal, a new multiflora double in bright scarlet red. It is excellent anywhere a vivid mass of color is needed. Pan-American Seed Co.

Double Multiflora Riches Blend, a mixture of 9 colors. George W. Park Seed Co. *Double Sugar Plum*, 2½ inch full double blooms, with over-all bright wine-red appearance. George W. Park Seed Co.

Scarlet Carnival, a brilliant red with yellow throat. Its flowers are large, waved and fringed. Bodger Seed Ltd., El Monte, California.

Carnival DeLuxe, a greatly improved mixture of fringed and waved flowers. Bodger Seed Ltd.

Roses — New roses introduced in 1963. (Later catalogues will contain other new roses.)

Royal Highness, a soft, pastel pink hybrid tea rose, 1963 All-America Rose Award winner.

Tropicana, an orange-red hybrid tea rose, 1963 All-America Rose Award winner.

Yellow Doll, miniature with yellow flowers.

Red Arrow, miniature with red flowers.

Scarlet Ribbon, climbing miniature of velvety-red.

Lady Ann, miniature with pink flowers.

Paddy McGredy, deep rose-pink floribunda with hybrid tea form.

Pink Masterpiece, light pink hybrid tea.

Ginger, floribunda in orange-vermillion color.

Floriade, orange-scarlet hybrid tea rose. This rose will be included in the Botanic Gardens test garden in 1963.

Columbus Queen, dawn-pink hybrid tea.

Summer Sunshine, yellow hybrid tea.

Chicago Peace, pink and yellow hybrid tea.

Orange Flame, orange-scarlet hybrid tea.

Mt. Shasta, white grandiflora with gray-green foliage.

Lucky Peace, blend of pink, salmon and yellow hybrid tea.

Grand Slam, a brilliant cardinal red hybrid tea. This rose will be included in the Botanic Gardens test garden in 1963.

Snapdragons — *Sprite*, available in a variety of colors: cherry, crimson, scarlet, white, and yellow, and a mixture called United Sprites. Bodger Seed Ltd.

Torch, fiery red in color and blooms two weeks earlier than the Rocket snapdragons. Pan-American Seed Co.

First Lady, which comes in a number of colors: orange, pink, crimson, white, yellow, and mixed. The spikes are at least 12 inches long with large ruffled flowers. It will produce two crops of blooms during a season. Ferry Morse Seed Co., Box 100, Mountain View, California.

Sweet Peas — *Dwarf Pygmy*, in medium blue, orchid, and cerise. William Zvolanek and Co.

Butterfly Mixed, a multiflora type. William Zvolanek and Co.

Richard, a deep scarlet cerise. Denholm Seed Co.

Delores, a deep rose. Denholm Seed Co.

Sandra, an orchid with white. Denholm Seed Co.

Dawn, a lilac with white back. Denholm Seed Co.

Stock — *Miracle Deep Purple*, lilac, pink, malmaison pink, and rose pink. Denholm Seed Co.

Zinnias — *Thumbelina*, All-America selections Gold Medal award winner for 1963. The dwarfest of cultivated zinnias. Only about 6 inches in height, the compact little ever-blooming plants continue to bloom over a long season. Many zinnia colors are represented in double blooms of 1¼ inches. *Firecracker*, All-America selections Silver Medal for 1963. Extra large flowers of brightest and richest scarlet red. Plants grow to 30 inches tall, with long-stemmed cactus-flowered blooms to 6 inches across and 2 inches deep.

Grand Canyon, in a color mixture of shades of red, lavender, yellow, and pink. Dareld Decker, P. O. Box 34, Chula Vista, California.

Apache Snowflakes, a dwarf, 6-8 inches in height, hardy and perennial, needs little watering, spraying or cultivating. Dareld Decker.

State Fair, a tetraploid zinnia with unusually strong plants that shrug off most garden diseases. It comes in shades of pink to deep rose, golden yellow, lavender-purple, yellow, salmon, and scarlet. The flowers have long stems and keep well for cutting. Ferry Morse Seed Co.

Vegetables — All-America Selections for 1963 offer five new vegetables:

Lettuce 'Buttercrunch', developed by Dr. G. J. Raleigh of Cornell University, is of highest eating quality and comparable with one of its parents, the famous Kentucky Bibb variety. Buttercrunch is much larger heading than Bibb, and is more



Zinnias Firecracker and Thumbelina.

Photo courtesy All-America Selections

heat-tolerant and slower to bolt to seed. A Silver medal winner.

Cabbage '*Emerald Cross*', is a true hybrid developed in Japan. Medium small heads, extra early to mature. A Silver medal winner.

Winter Squash 'Hercules', is of the Butter-nut type, but is larger, thicker fleshed and with a straight solid neck. Needs only about 82 days for maturity. A Silver medal winner.

Summer Squash 'Greyzini', a grey Zucchini type, but generally earlier and a heavier bearer on more vigorous bushy plants.

Snapbean 'Executive', a Tendergreen type bean with darker green, full round pods of good length.

This is, of course, only a partial list of plant offerings for 1963. As other new catalogues arrive, you will find other intriguing plants listed. Don't stop with the plants mentioned above — browse through many catalogues before making your selection.

Heigh Ho!

Plan for the Plant Sale in May !!!

? ? PETE PONDERS ? ?

Dear Pete,

Our home nestles on a steep southwest slope. Is there a ground cover (that looks good both summer and winter) for our terrace with this exposure?

NITA SLOPE

Dear Nita,

For the low-down on ground covers for your slope meet these natives!

Pussytoes, *Antennaria*, in many varieties, is a real ground-hugger. Its felty year-round foliage is harmonious with grey lichens. Its white to reddish soft flower heads resemble kitten's toes and must be clipped once a year if you want a neat cover.

Kinnikinnick, *Arctostaphylos uva-ursi*, an evergreen trailer with delicate pink blossoms and red berries, would be lush.

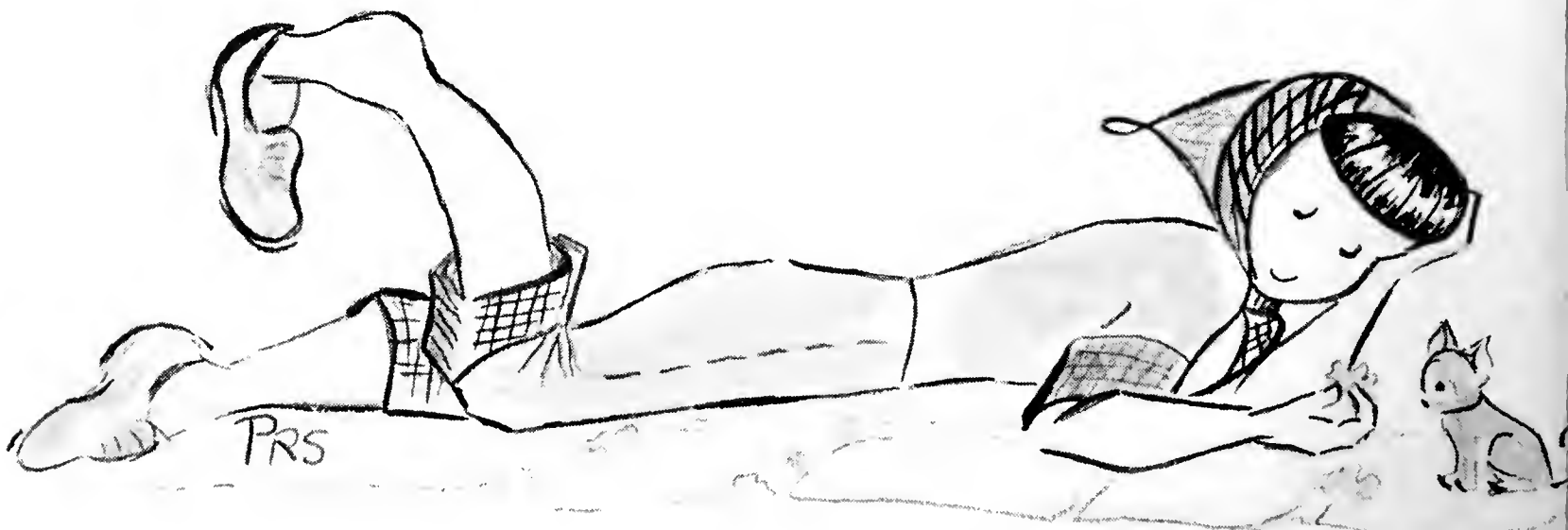
Oregon-grape, *Berberis repens* (*Mahonia repens*), will grow about 12 inches tall but takes vigorous pruning. Its holly-like leaves, while not as leathery as *Mahonia aquifolium*, are soft blue-green in summer and rich mahogany in winter. Yellow flowers appear in early spring followed with blue berries in August.

Sulphur flower, of the genus *Eriogonum*, is an attractive matted plant

with deep green leaves hairy underneath. Flowers, in umbrella-like clusters, vary from cream-yellow to light orange.

These native ground covers often thrive in partial shade in the mountains, but they have withstood our intense sunlight and drought-like conditions on a south exposure for many years. Although most are extremely difficult to transplant, thanks to Harry Swift's propagation prowess these plants are available through most of our local nurseries.

If you prefer cultured company instead of natives, year-round beauties would include junipers, especially such varieties of *Juniperus horizontalis* as *admirabilis*, *andorra*, and perhaps Black Hills. *J. chinensis procumbens* is excellent. Some evergreen sedums or the evergreen varieties of creeping *Phlox subulata* might please you. The Don Estey hillside on Lindenwood drive boasts *Euonymus coloratus*. Many feared for its survival, but losses among 80 plants have been trivial. This creeping euonymus has slender green leaves which turn mahogany in winter. Healthiest plants in this location receive the greatest supply of water.



ORCHID BOOK COLLECTION

MR. AND MRS. K. J. KING have presented to the Helen Fowler Library a collection of books on orchids. Mr. and Mrs. King are charter members of the Denver Orchid Society and Mr. King is a past president. Many of the books are of a popular nature and numerous ones are mainly of interest to those specializing in the culture of orchids. The majority are in English, a few in foreign languages. The following are included in this collection:

Orchids, Their Description and Cultivation, by Charles H. Curtis, Putnam & Co., Ltd. of London, 1950.

This book deals with orchids from every point of view — their history, descriptions of genera and species of horticultural and of botanical interest (with cultural notes), their hybrids, and even a section on orchid bibliography.

Orchids of Guatemala, by Oakes Ames and Donovan Stewart Correll. 2 vols. Chicago Natural History Museum, 1952-53.

A listing of all the known orchids of Guatemala (and British Honduras), a total of 527 species and 25 varieties in 89 genera. Detailed illustrations of all genera and more than 100 additional species.

Orchids and How to Grow Them, by Adelaide C. Willoughby. Oxford University Press, 1950.

A practical book on orchid culture, including such subjects as suitable housing for orchids, orchid potting, pests and diseases of orchids and, more specialized, growing orchids from seed.

Orchids: Their Culture and Management, by W. Watson. 1903 edition by H. J. Chapman. L. Upcott Gill, London, and Charles Scribner's Sons, New York, 1903.

Contains full descriptions of all species and varieties that are in general cultivation, a list of hybrids and their recorded parentage, and detailed cultural directions. Illustrated.

Heigh Ho!
Plan for the Plant Sale in May!!

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Things To Do In January and February

NOW IS THE TIME to plan next summer's garden so that it will be better than last summer's. Try to remember those things that you wanted to improve, and plan how best to do this. Did you make notes of things you wanted to change? You might plan on doing that this summer.

Read the new seed catalogues — they will give you many helpful ideas. Remember that not all of the tempting plants offered will grow in Colorado. If you are in doubt about the hardiness of a plant, check with a local nurseryman.

Is your garden colorless at this time of year? Now is the time to see where a red- or yellow-twigged shrub or an evergreen could be placed to give your garden color and interest next winter. Consult with your local nurseryman for kinds and planting times, and place your order early to be sure of getting what you want.

Check those stored bulbs. If they are shriveling, place them in *barely* damp peat moss. The packing must not be too moist and the bulbs must be kept cool or they will start to grow.

Now is the time to put your garden equipment in shape for spring. Get out a file and sharpen the hoe and spade. Paint, clean up and repair all your tools.

Prune any broken branches on trees and shrubs, but delay pruning of flowering shrubs as much as possible until after the flowering season, in order to enjoy the maximum amount of bloom. Trees which "bleed" easily, such as maple, birch, or walnut, should receive only emergency trimming now. Reserve other pruning until they have come into leaf.

If you have an elm or other large tree which you suspect may have scale, call your arborist now so that he can work the spraying of your trees into his busy schedule. Arrange now to have evergreens sprayed when the weather permits.

Tender-barked trees such as mountain ash should be protected from sunscald by shading or wrapping the trunk. (See Mr. Stadler's article, page 19.)

Tuberous begonias may be started in February. Use good potting soil to which a little bone meal has been added. Plant in flats or pots, with concave side of bulb up. If started in flats, transfer to pots when the plants are 2-3 inches high.

Force some branches of forsythia or flowering quince. Cut the branches with a slanting cut, place in cool water in a dark place for a few days, then bring to the light. Some persons have better luck when they crush the basal end of the branch before placing in water.

Check those house plants. At this time of year they often need a bit of pruning, or a little fertilizer. Cuttings of geraniums, coleus, or begonias may be made now to provide bedding plants for the garden.

Check the soil south of buildings or on steep slopes. Water may be needed in special locations, particularly if the soil is sandy.

Now is the time to prune grapes. Cut out weak wood, thin stems to about a foot apart, and cut back new growth to about 9 buds.

Get out your back copies of *The Green Thumb* and re-read seasonal articles. These old issues contain a wealth of information that never grows out-of-date. If you do not have back issues, come to the Helen Fowler Library at Botanic Gardens House and browse through the bound copies here.

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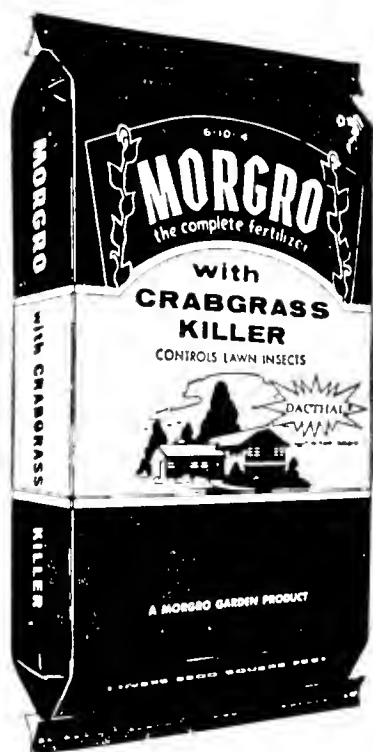


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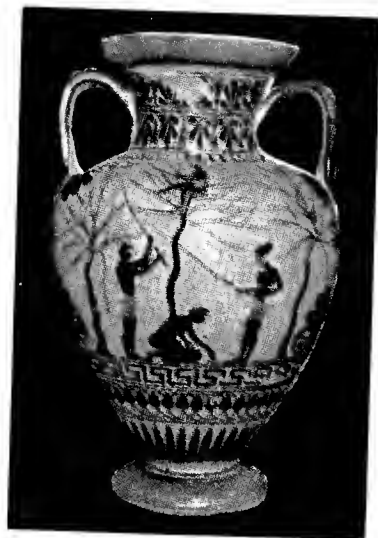
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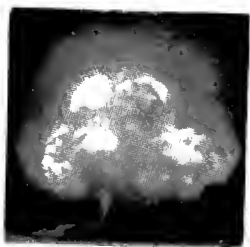
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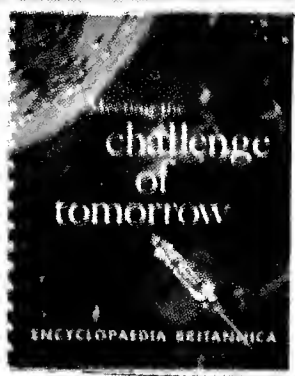
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THE COVER

TROPICANA ROSE — 1963 All-America

Photo courtesy of Jackson and
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Notes and Notices

AFRICAN VIOLET SHOW sponsored by the Rocky Mountain African Violet Council will be held at Botanic Gardens House, 909 York Street, on Saturday and Sunday, April 20th and 21st, from 12:00 noon until 5:00 p.m. Public invited. Admission free. Mrs. Gretchen Clayton, Chairman. SU 1-3468.

THE COLORADO GLADIOLUS SOCIETIES recommend four new All-America beauties this year.

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If you would like to get acquainted with others interested in Gladiolus, just mail your name and address to Mrs. W. S. Wood, 295 Allison St., Lakewood, Colorado.

SINCERE THANKS from the staff at Denver Botanic Gardens to the good friends who made it possible for the offices to be equipped with a new and modern mimeograph machine. Mimeograph work will be done for garden clubs at a very reasonable rate.

CALENDAR of EVENTS

Every Saturday Morning — 9:15 a.m., KLZ Radio
The Green Thumb Program, Herbert Gundell, Denver County Agricultural Agent

Every Saturday Afternoon — 3:30 p.m., KLZ-TV, Channel 7
The Weekend Gardener, Herbert Gundell

AT BOTANIC GARDENS HOUSE

MARCH

- 4 — Monday, 9:30 a.m., Denver Botanic Gardens Junior Committee
- 5 — Tuesday, 12:30 p.m., Mountain View Garden Club Luncheon Meeting
- 6 — Wednesday, 2:30 p.m., Parks-Recreation Gardeners' Meeting
7:30 p.m., Botany Club
- 7 — Thursday, 9:30 a.m., 4-H Club Leaders' Meeting
7:45 p.m., Orchid Society
- 8 — Friday, 10:00 a.m., Colorado Federation of Garden Clubs State Board Meeting
- 11 — Monday, 10:00 a.m., Judges' Council
- 12 — Tuesday, 10:00 a.m., Herbarium Study Group
- 13 — Wednesday, 2:30 p.m., Parks-Recreation Gardeners' Meeting
2:00 p.m., The Green Thumb Editorial Committee
7:30 p.m., Landscape Contractors

MARCH

- 14 — Thursday, 7:30 p.m., Denver Rose Society
- 18 — Monday, 4:00 p.m., Denver Botanic Gardens Board Meeting
- 19 — Tuesday, 1:00 p.m., Rocky Mountain African Violet Council
- 20 — Wednesday, 9:30 a.m., Fun with Flowers Workshop
- 21 — Thursday, 10:00 a.m., Around the Seasons Club
- 22 — Friday, 1:00 p.m., Ikebana International Flower Arranging Class
- 27 — Wednesday, 7:30 p.m., Landscape Contractors

APRIL

- 1 — Monday, 9:30 a.m., Denver Botanic Gardens Junior Committee
- 2 — Tuesday, 12:30 p.m., Mountain View Garden Club Luncheon Meeting
- 3 — Wednesday, 7:30 p.m., Botany Club
- 4 — Thursday, 7:45 p.m., Orchid Society



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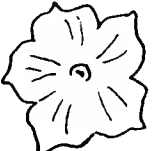




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Colorado Wild Flowers by HAROLD and RHODA ROBERTS (a museum pictorial).....	1.25
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How to Identify Plants by H. D. HARRINGTON and L. W. DURRELL.....	1.45
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The Secret of the Green Thumb by HENRY and REBECCA NORTHEN.....	5.00
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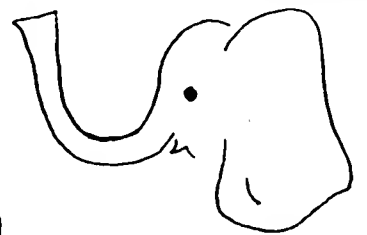
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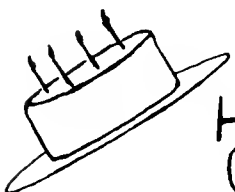
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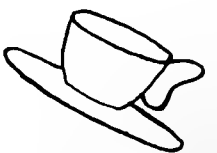
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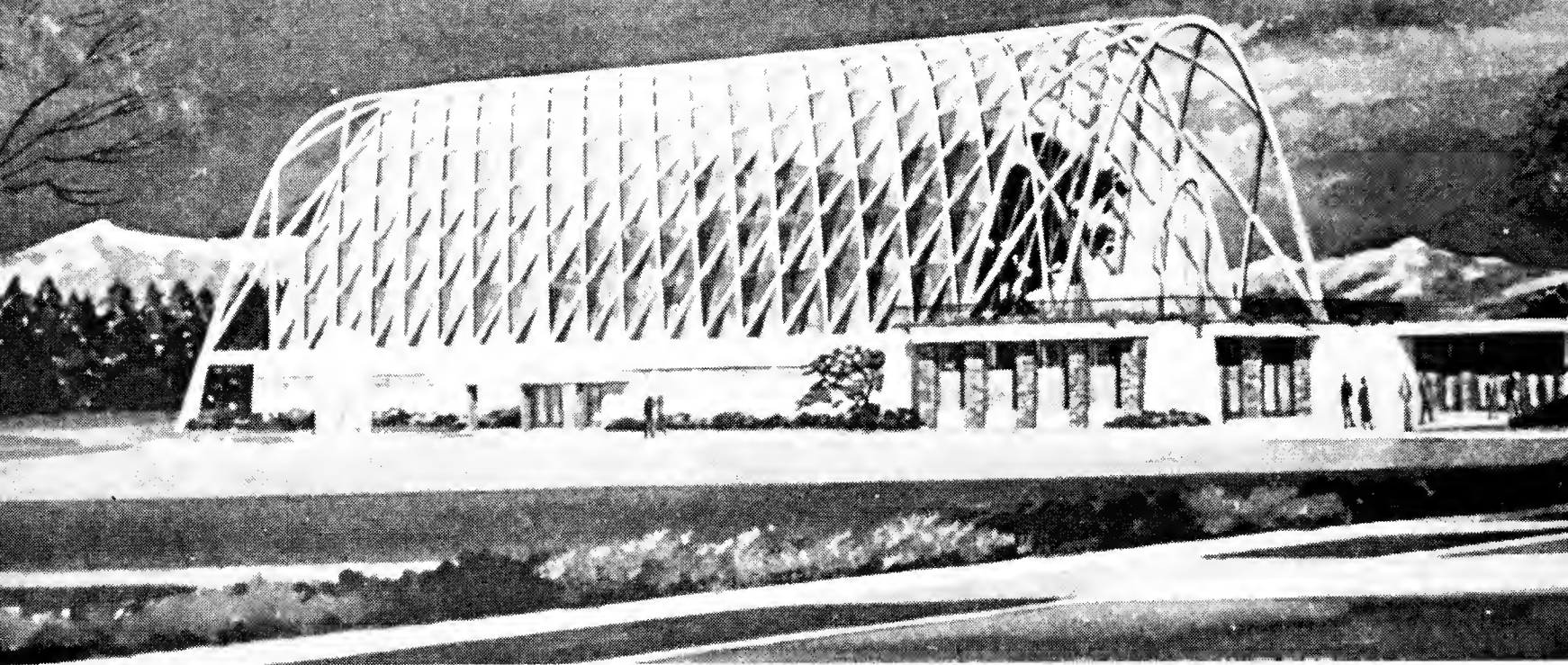
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2700 So. Colorado Blvd.,
Denver, Colo.

700 Peoria, Aurora, Colo.

Our Conservatory



A. C. HILDRETH, *Director*

SOON DENVER will have a Conservatory. This fine addition to the city's attractions has been made possible by the Boettcher Foundation's recent gift of \$600,000 to Denver Botanic Gardens for erection of a conservatory building. A previous grant of \$10,000 was made in March, 1962, for preliminary studies and plans. Construction work will begin by mid-summer.

This magnificent structure will be a memorial to the late Mr. and Mrs. Claude K. Boettcher, who had shown deep interest in providing a Conservatory for the people of Denver long before Denver Botanic Gardens came into existence.

After reviewing the plans, Mayor Dick Batterton commented as follows: "In my opinion, such a conservatory will be a tremendous asset to Denver and one which will be appreciated by an overwhelming majority of our citizens as well as by thousands of visitors to the Mile-high City. To my way of thinking, no cultural development can be envisioned which would have such a wide appeal nor such an inspiring and salutary impact on our community."

Both the Mayor and the Council of the City and County of Denver have expressed willingness to appropriate funds for the operation and maintenance of the Conservatory. In fact, the Boettcher Foundation made such financial support from the local government a condition of the grant.

Designing and supervising architects are Mr. Victor Hornbein and Mr. Edward D. White, Jr., both of Denver. Consultants are Mr. Walter Kelsey of Tarrytown, New York, a specialist in greenhouse and conservatory design, and Mr. T. H. Everett, Assistant Director of The New York Botanical Garden, who

has made extensive studies of conservatories both in America and Europe.

The Conservatory will be a huge structure. The plant-growing part will be 144 feet long, 72 feet wide and 51 feet high and will have more than 10,000 square feet of floor space. In addition, there will be space for the heating and air-conditioning system, storage and work rooms and an entrance lobby.

This lobby will serve both the Conservatory and a future Horticulture Hall. The latter building will contain a large meeting and exhibit room, class rooms, library, herbarium, laboratories and offices. It is hoped that enough money can be raised to permit construction of Horticulture Hall at the same time that the Conservatory is built, but at present no such funds are available.

The complex of Conservatory and Horticulture Hall will be located in our York Street unit along the northern boundary of the property and west of York Street. A range of greenhouses to the west of the Conservatory is planned for the future.

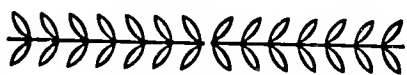
These buildings will be located so as not to obstruct the view of the mountains to the west and south. The Con-

servatory will have a high balcony on the west end, overlooking most of the garden and affording an excellent vantage point from which to see the grand mountain panorama.

A conservatory is essentially a special type of greenhouse for displaying interesting plants that cannot survive out-of-doors in the locality of the conservatory. In common with all temperate-zone conservatories, ours will feature plants of tropical and subtropical regions.

The tropics are very rich in plant species but our conservatory can display only a few which are of most botanical interest or of greatest horticultural merit and also some of the economic species that yield products of importance in our daily lives. Although esthetic effect is not the chief concern of a botanic garden, there will be many beautiful plants in our conservatory and all will be arranged to give a pleasing landscape effect.

Such a plant collection will contribute to the enjoyment and botanical appreciation of the general public. It will be invaluable to teachers and students of biology in our schools and colleges, many of whom might otherwise never see living tropical plants.



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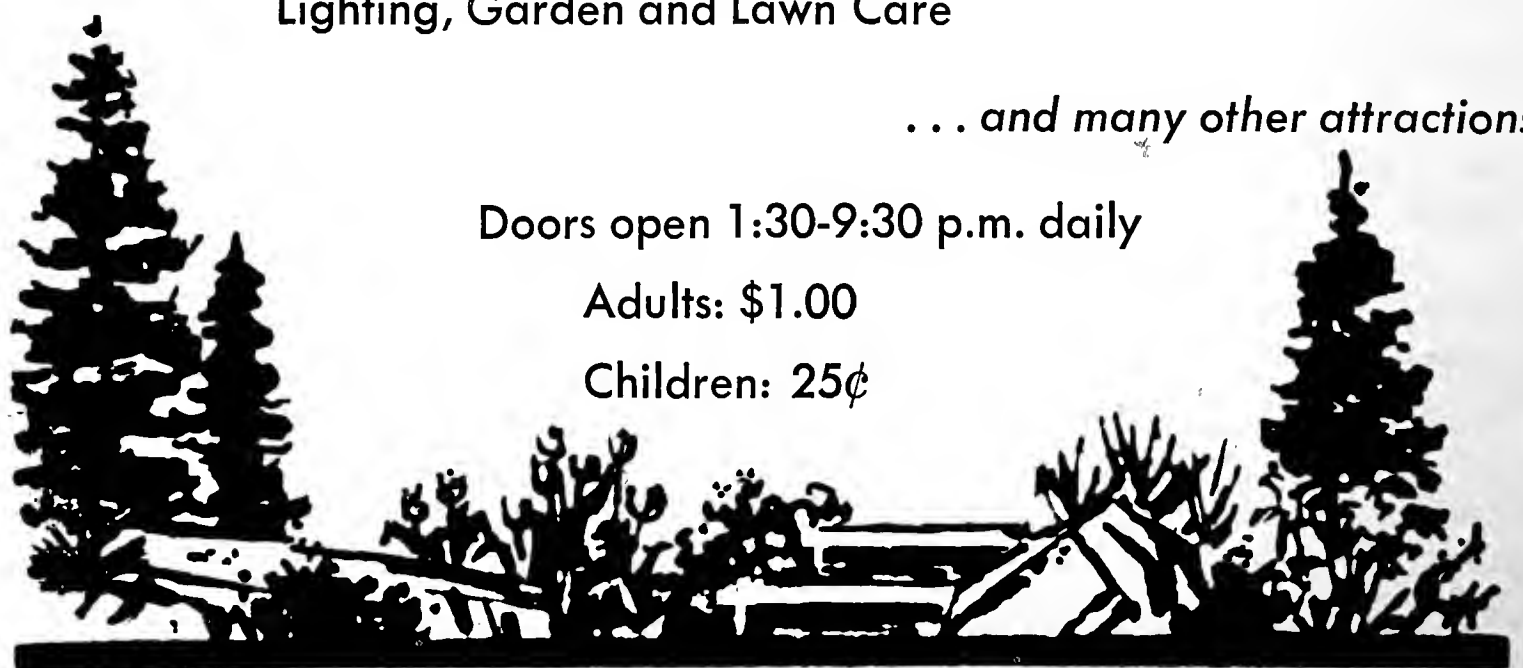
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Adults: \$1.00

Children: 25¢



4th Annual

1963 COLORADO GARDEN and HOME SHOW

DICK HAUGHTON, *General Manager*

ONE OF COLORADO's most spectacular floral exhibitions will burst forth again with color and a shower of practical ideas for Coloradoans on March 30th. This year's show will be expanded in both title and length. "Better Outdoor-Indoor Living For You" will be the theme of the show which now has the word "Home" in the title, and will run nine days through April 7th, instead of eight days as during the two most recent years. The show will be staged in Denver's National Western Stadium and Exhibit Hall.

Sponsored by the Denver Botanic Gardens, the non-profit show has grown each year with over 50,000 persons attending in 1962. Proceeds of the show go to the Denver Botanic Gardens and the event is dedicated to the purpose of bringing to people everywhere a greater knowledge of improved outdoor and indoor living information with an emphasis on color, design, flowers and foliage.

Feature Garden designer Gene Eyerly has followed the Garden and Home Show theme for 1963 closely. Because of large crowds the designer has concentrated on a layout which will allow maximum convenience of traffic patterns in the main garden area. The east and west focal points of the Garden will be the World Globe at the east end, and the modern garden with a home scene at the west. Surrounding the arena will be two large flower banks,

the Rustic Garden, Rose Garden and Japanese Garden. Brief descriptions of the garden settings are as follows:

World Globe — This rotating world globe shows 16 flowers together with the countries of their origin. Ribbons run from countries on the revolving globe to containers of flowers.

Modern Garden — A distinctive house facade sponsored by Wood, Inc., is the setting for the modern garden which will give some practical ideas to the homeowner. This garden achieves a complete and pleasing design, with balance between smooth and rough texture, curved and straight lines, contrast and repetition.

Flower Banks — There will be two large banks of flowers at the east end of the arena which will serve as a circular "Frame" for the World Globe as the public walks east down the center aisle of the show.

Rustic Garden — Outdoor living with a rustic flavor will be seen in this garden scene which utilizes a terrace effect to take away from the strictly level look. Redwood patio furniture carries out the rustic theme and invites the family to begin planning for summer outdoor living fun.

Rose Garden — An arbor with fence background will highlight several of the new 1963 rose introductions. More than fifty rose bushes will adorn this

garden with its contrasting levels and variety of texture.

Japanese Garden — One of the fastest growing schools of garden design in the U. S. today is the Japanese garden. Stanley Yoshimura again will bring one of the distinctive Japanese garden designs to the public

The National Western Exhibit Hall will be filled to capacity with informative and educational displays by commercial exhibitors. The quality of displays has risen each year and many of the individual displays attract equal attention with the feature garden. This year's theme of "Better Outdoor-Indoor Living For You" will be carried out as the various local and national companies offer the newest and latest ideas in products and services.

Several other popular sections of the show will be described below: **Aquarium Show**, **Bonsai Club Exhibit**, **Competitive Flower Show**, **Product and Service Theater**, **Men's Garden Club Exhibit** and the **Garden and Home Theater**. These and other special displays will round out this major exhibition. **Aquarium Show** — This will be the 11th Annual Aquarium Fish Show sponsored by the Colorado Aquarium Society. Their theme will be "The Parade of the Exotic Fishes" and several hundred fish will be displayed on a competitive basis. This popular show will be staged at the west end of the National Western Stadium.

Bonsai Club Exhibit — Flower arrangement and distinctive decoration ideas are two of the worthwhile values which come from a study of this exhibit. Always a favorite at the show, this display can be seen at the south edge of the Stadium arena.

Competitive Flower Show — The Federated Garden Clubs of Colorado will again present this event which is entitled "Beautiful Colorado." This is a

highly popular section of the show with changes in the flower arrangements being made daily. Table settings and dried arrangements give many new ideas to those attending. This will be featured at the southwest corner of the Stadium.

Product and Service Theater — This will be a new feature of the 1963 Show. It will be located at the northwest corner of the Exhibit Hall. There will be a continuous series of film and personal demonstrations of equipment and products.

Men's Garden Club Exhibit — This will comprise over 100 feet of displays by the Men's Garden Clubs of Colorado. These will be competitive garden scenes. This very interesting feature of the Show will be located along the south corridor of the Stadium.

Garden and Home Theater — This will be a leading feature of the show with the following events scheduled (exact time to be given later in the press):

AFTERNOON EVENTS

Flower Arranging
Fashion Show (3 p.m.)
Cooking Presentation

EVENING EVENTS

Indoor-Outdoor Lighting
Fashion Show (8 p.m.)
Barbecue Demonstration
Garden and Lawn Care

The success of the 1963 Colorado Garden and Home Show is due entirely to the combined efforts of many sponsors, contributors, exhibitors, garden clubs and the advertising and news media which are giving their best efforts to make this an excellent show. The women's and men's garden clubs do an outstanding job on advance ticket sales throughout the state. In tribute to the statewide efforts which support the show, feature days will be as follows:

Mar. 30 — Sat. — Colorado Springs

Mar. 31—Sun.—Southern Colorado
Apr. 1— Mon. — Denver (City and
County)

Apr. 2 — Tue. — Tri-County Area

Apr. 3 — Wed. — Boulder

Apr. 4 — Thur. — Ft. Collins-Gree-
ley

Apr. 5 — Fri. — Loveland - Long-
mont

Apr. 6 — Sat. — Eastern Colorado

Apr. 7 — Sun. — Western Slope

We invite you to come and to tell all
your friends about this colorful Colo-
rado show!



General Manager of the Show

THE GENERAL MANAGER of the 1963 Colorado Garden and Home Show is Dick Haughton. In addition to his work for the Garden and Home Show, Haughton directs several other major area trade shows each year including the Colorado and Kansas Sports Boat and Travel Shows. The new manager served as Exhibit Sales Manager for the first three years of the Colorado Garden Show and has attended many of the nation's leading garden and home shows.

Haughton received his Master of Business Administration Degree from the University of Denver in 1952, and following a 4-year tour of duty as a Navy Officer in Washington, D. C., returned to Denver in 1956. He feels that the Colorado Garden and Home Show will grow to be one of the largest and most popular trade shows in the region. Also, he hopes the show will serve as a focal point in the continuing effort to



DICK HAUGHTON

keep Colorado Colorful and to enhance the knowledge of all persons attending the Annual Exposition.

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For the Show

MICHAEL C. AVERILL

YES, THERE WILL BE hundreds of fish splashing around in their own aquariums just waiting for the thousands of people to view them at the 1963 Colorado Garden and Home Show, March 30, through April 7, 1963. The fish show will be exhibited by the Colorado Aquarium Society, a non-profit organization for the betterment of the tropical fish hobby.

The electric eel, from South America, will be one of the most exciting fishes that will be on display. With the special modified lateral muscles, the electric eel can generate up to 500 volts of electricity and when discharging in a favorable position, it is sufficient to stun large animals.

The piranha, flesh eater of the Amazon River will be another attraction which everyone will enjoy watching — that is, as long as there is plate glass between you and this savage. As you look into his mouth you will notice his razor sharp teeth that can snap a finger off if you dare offer it to him. In the Amazon River, hundreds of these fishes can be attracted by blood and will come several miles to eat helpless victims in only a matter of seconds.

There will be fishes that give live birth to their young, and those that will lay eggs, and those that float their eggs in a nest of bubbles. Also, there will be

a salt water nurse shark, sea horses, angel fishes, sword tails, platies, neon tetras, catfishes and many of the hundreds of tropical fishes that are found around the world.

You will find some of the fish with their long flowing fins swimming slowly by in their own graceful style while others dart from one place to another with the speed of lightning. It will be so peaceful and beautiful with colors of brilliant yellow, crimson, orange, rose-pink, lilac, scarlet, vivid greens and blues of every shade which will blend and intermingle.

Decorating the home with aquariums is getting to be very common because of the great interest in ocean life and the wide variety of different types of beautiful aquariums that can be used in the home to give it this aquatic appearance. It is truly a hobby of great interest and has educational value covering a wide range from home beautification to mental therapy.

Members of the Colorado Aquarium Society will be on hand to answer questions pertaining to the tropical fish hobby and to the Society.

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Designer of the Show

SHOW DESIGNER Gene Eyerly worked with the management of the Des Moines and Chicago Garden Shows between 1956 and 1959. He brings many new ideas into the feature garden based on this experience. The 1963 Garden has a strong emphasis on the garden and home setting combined with the international flavor of the World Globe and Japanese Garden.

Eyerly, a navy veteran of W.W. II and the Korean conflict, is a graduate of the American Landscape School in Des Moines and has served as a landscape designer and project superintendent in the Rocky Mountain region since 1959. He was associated with Alameda Nursery between 1959 and 1962 and is currently doing landscape design and management work with Lew Hammer, Inc. This background of landscape and horticulture work in this region combined with his previous work on garden shows can be readily



GENE EYERLY

appreciated by those attending the 1963 Colorado Garden and Home Show.

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Show Manager — DICK HAUGHTON — 477-5994 or 477-9670
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General Chairman — MRS. JESS GIBSON — 5673 S. Prescott Street,
Littleton, Colorado — PY 4-0191

Entries — MRS. CARL FAURSCHOU — 4831 Newton — GL 5-8245,
Denver 20, Colorado

Staging — MRS. J. V. CARROLL — BE 3-5524;
MRS. DONALD MOSS — HA 2-0038

Judges and Awards — MRS. ALBERT PETRICK — SU 1-5054

DIVISION I — ARRANGEMENTS

Beautiful Colorado as expressed in floral design.

SECTION 1 — Fresh cut material predominating. Accessories permitted. Card of interpretation to accompany each exhibit.

Class 1 — SPACIOUS SKIES — Showing good use of space. Make as modern as you wish — large. Background provided. This class will show March 30, 31 and April 1.

Class 2 — FRUITED PLAINS — Large. Fresh fruit and plant material may be used. Background provided. Will show March 30, 31 and April 1.

SECTION 2 — These classes will show April 2, 3 and 4.

Class 3 — MAJESTIC MOUNTAINS — Our snowcapped peaks and purple mountains should give you many ideas. Large arrangements, please. Background provided.

Class 4 — LONE PRAIRIE — Large, lovely arrangements of dried material. Background provided.

SECTION 3 — These classes will show April 5, 6 and 7.

Class 5 — RHYTHM OF THE RUSHING STREAMS — Large, showing your interpretation of rhythm. Backgrounds provided.

Class 6 — GRAND MESA — Gracious living as we know it. One placement table setting for outdoor living.

SECTION 4 — Dried Plant Materials. (Entries to be made on Saturday, March 30 to remain on display until 10 p.m. Sunday, April 7.)

Class 7 — PLAQUES AND ORNAMENTS — Any type, any size not shown previously in competition.

a. Singles.

b. Pairs.

DIVISION II — HORTICULTURE

Colorado's Beautiful Horticulture

SECTION 5 — Cut flowers, 5 stems unless otherwise stated, to be shown in glass containers. (Classes in this section will change every three days.)

Class 8 — SPRING FLOWERING BLOOMS. Committee reserves right to subdivide as indicated by number of entries.

Class 9 — FLOWERING SHRUBS or TREES — one stem not over 18" long.

SECTION 6 — Growing plants.

Class 10 — DISH GARDENS, BOTTLE GARDENS which have been planted and maintained by exhibitor for at least one month.

Class 11 — POTTED PLANTS.

a. Flowering.

b. Foliage.

c. Slips or cuttings by exhibitor.

d. Pot or flat of seedlings by exhibitor.

MEMBER



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Technical Advisor of the Show

PAT GALLAVAN is Technical Advisor to the show manager and also serves as Director of the Garden and Home Theater. He will give a presentation each evening in the theater on Lawn, Tree and Shrub Care in the Rocky Mountain Region.

Gallavan is a graduate of Denver University with a B.A. and M.A. in botany. He is Secretary of the Colorado Nurserymen's Association and Director of the Colorado Garden Show, Inc. His activities include the Denver Rose Society, the Men's Garden Club and the Swingle Study Group. Formerly the Executive Manager of the Colorado Forestry and Horticulture Association and Editor of *The Green Thumb* magazine, he is now Superintendent of Denver Mountain Parks.



PAT GALLAVAN



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cated to new and better uses of wood in all phases of construction. Its members include the following types of firms: retail, warehouse wholesale, office wholesale and miscellaneous wood products. The organization has many informative pamphlets available to the public on the various uses of wood through their office at 2106 Tower Building, Denver 2, Colorado.

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MARCH 30-APRIL 7, 1963

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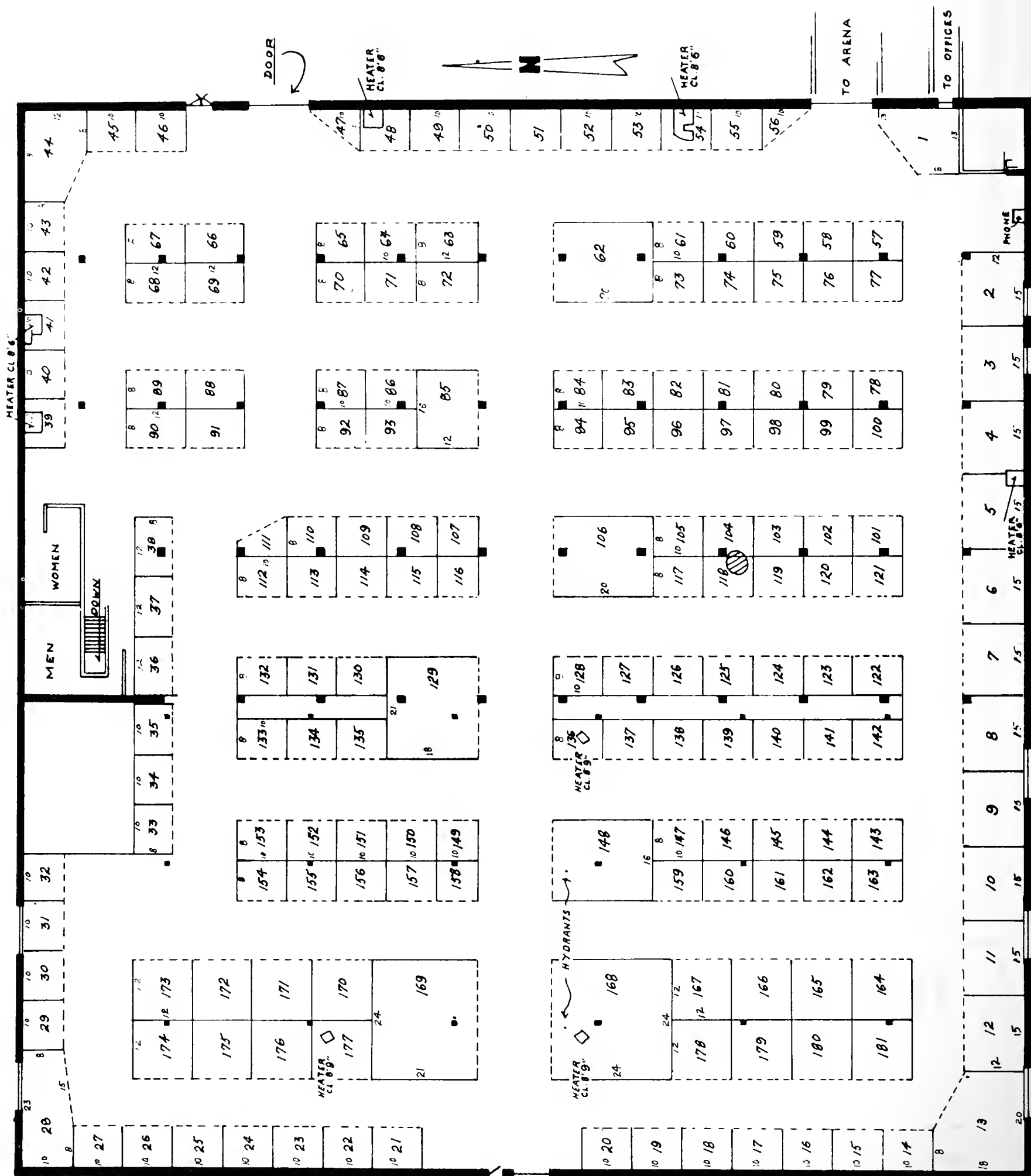
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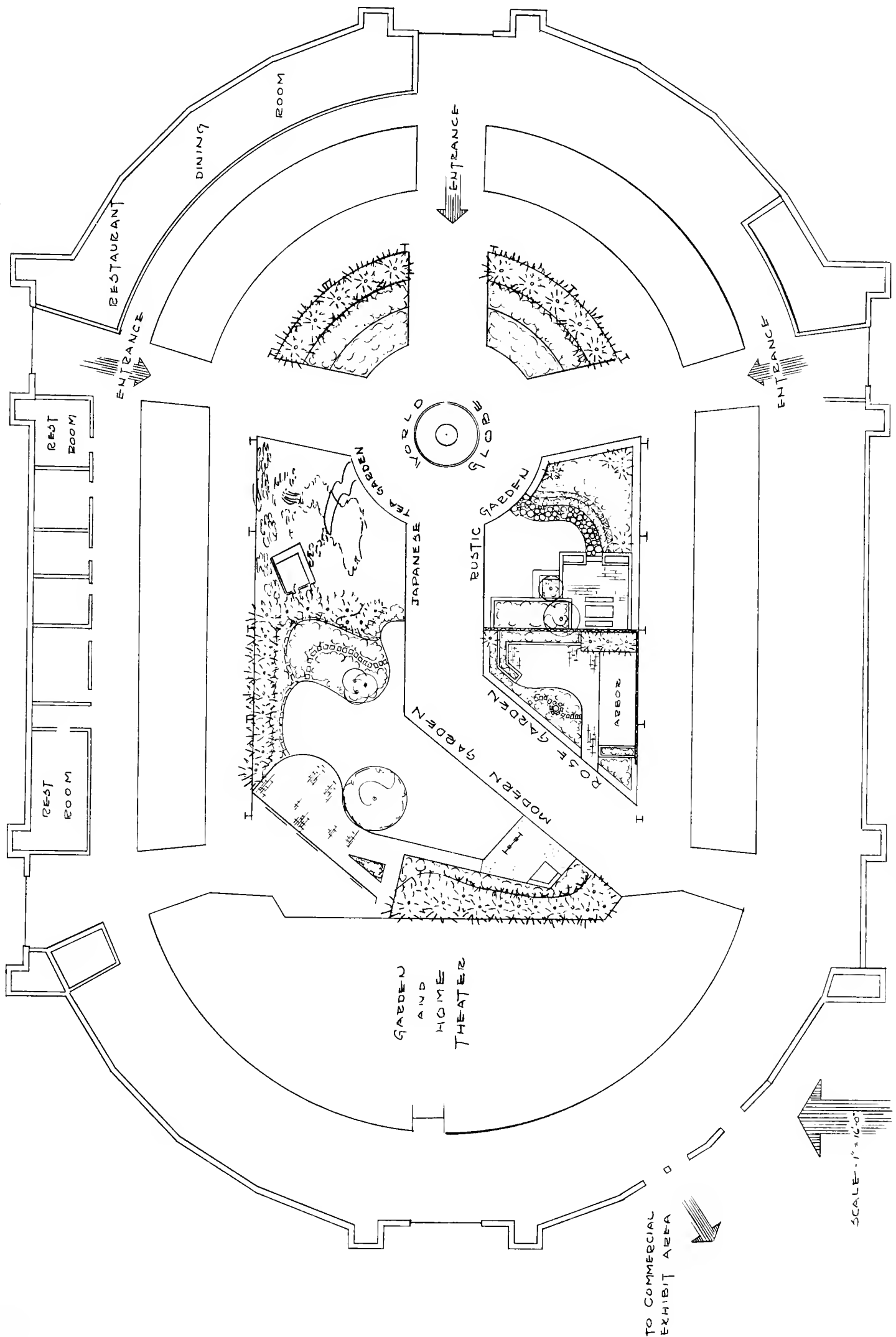
7505 E. Harvard

PL. 5-0363

EXHIBIT HALL



FEATURE GARDEN



MASTER PLAN - 1963 COLORADO GARDEN & HOME SHOW
 8-2-62
 GENERAL MANAGER - DICK HAUGHTON - DESIGNER - GENE EYERLY -

INCREASED ACTIVITY

In The Helen K. Fowler Library

FRED R. JOHNSON

THE HELEN K. FOWLER Library Committee is now engaged in working over the books to make the library more useful to members of Denver Botanic Gardens and the general public.

The first thing on the program is the preparation of a pamphlet file by subject headings so that this vast amount of miscellaneous material can be more easily used for reference purposes.

Next, an inventory will be taken of all the publications in the library and all surplus or obsolete material will be eliminated or stored. Some of these books, as well as books which do not pertain to a botanical library, may be used as trading stock with other libraries, or sold. Thus, additional space will be provided for new acquisitions which are now being ordered. There is about \$1,300 available for book purchases in the fund raised by the late Mrs. Helen Fowler.

Mrs. Moras Shubert, of the Colorado State Library staff, has been working as a consultant in developing procedures to be followed and has prepared a statement of policy regarding disposition of private library gifts to the Helen Fowler Library. This policy was adopted by the committee. The fine book collection of the late M. Walter Pesman and also material from the library of the late Kathryn Kalmbach will be indexed and catalogued.

A much-appreciated gift from committee member, Mrs. Charlotte Barbour, is making it possible to use professional help to functionalize the library and to expedite the preparation of the pamphlet file. Mrs. Arthur Hellriegel, a graduate of Denver University Library School, who has contributed a great deal of time on a volunteer basis, will supervise this program with the clerical assistance of Mrs. Florence H. Jones.

Other members of the committee will serve on sub-committees for purchasing, inventory and review of gift collections. Later, we hope that they will act as library attendants in order to keep the library open when the regular staff is not on duty.

The committee will also collect historical material pertaining to Denver Botanic Gardens. In this connection, we express our appreciation to the Park Hill Garden Club (Mrs. Gerald Gorsuch, President) whose members are mounting in scrap books the large collection of historical material gathered by M. Walter Pesman.

Other members of the Library Committee not mentioned above are: Mrs. Graham Morrison, Mrs. F. W. Ethell, Mrs. Harold Bergman, Mrs. Helen Vincent, Dr. A. C. Hildreth, Clyde Learned and Fred Johnson, Chairman.

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ROSE PINK PARFAIT

Photo courtesy of Armstrong Nurseries

A Selection of Roses

For The Rocky Mountain Region For 1963

CLYDE E. LEARNED

WE ARE NOW nearing the time of the year when we are about to purchase our new roses. The question is, are we going to buy the new and recently selected All-America roses, which are usually one to two dollars more per bush or are we going to decide on a selection of the less expensive tried and true roses that have stood the test of time and are still the top favorites, as well as probably being the best buys.

The final decision will probably be, as it should be, a compromise, in which a number of the recent All-America selections will be purchased and a greater number of the old reliables will be acquired.

In an effort to assist the new and less experienced rose growers, recommended lists of the best hybrid teas, grandifloras, floribundas and climbers from which to pick have been prepared. These selections are based on the experiences of the members of the Denver and American Rose Societies and the results obtained in our Denver Botanic Gardens at City Park and 909 York Street as well as my observations in my own and many private gardens in this area. It will be noted that these 1963 lists are quite similar to my lists in *The Green Thumb* of March, 1961 and April, 1962, except that a number of the most promising of the newer creations have been added.

The hybrid teas recommended are:

1. Peace	Yellow Blend	All-America in 1946
2. Crimson Glory	Dark Red	Introduced in U.S. in 1935
3. Charlotte Armstrong	Light Red	All-America in 1941
4. Tropicana	Orange-Red	All-America in 1963
5. Chrysler Imperial	Dark Red	All-America in 1953
6. Tiffany	Pink Blend	All-America in 1955
7. Rubaiyat	Light Red	All-America in 1947
8. Confidence	Pink Blend	
9. Helen Traubel	Pink Blend	All-America in 1952
10. Garden Party	Nearly White	All-America in 1960
11. Mme. Henri Guillot	Red Blend	Introduced in U.S. in 1938
12. Tally Ho	Light Red	All-America in 1949
13. Sutters Gold	Orange Blend	All-America in 1950
14. Kings Ransom	Dark Yellow	All-America in 1962
15. Show Girl	Medium Pink	
16. Nocturne	Dark Red	All-America in 1948
17. Eclipse	Medium Yellow	Introduced in U.S. in 1935
18. Mirandy	Dark Red	All-America in 1945
19. Mojave	Orange-Red	All-America in 1954
20. Pink Favorite	Medium Pink	
21. Duet	Two Tone Pink	All-America in 1961
22. South Seas	Pink Blend	
23. White Knight	White	All-America in 1958
24. First Love	Light Pink	
25. Mission Bells	Pink Blend	All-America in 1950

It is interesting to note that of the 25 recommended hybrid tea roses, 17 were chosen by the All-America Selection Committee as All-Americas, whereas 3 of the roses — Crimson Glory, Mme. Henri Guillot and Eclipse — were introduced from Europe into the United States prior to the establishment of the All-America Selections.

It is admitted, that it was more or less of a tossup in selecting the last 5 or 6 roses in the above list inasmuch as there are a number of other excellent hybrid tea roses that do well in Colorado and that could have been included. However, it is believed that this recommended list should be very helpful and satisfactory in making a selection.

During recent years the grandifloras, which are a cross between the hybrid teas and floribundas, have performed very well in this region. In general these roses are a little taller than the hybrid teas and although some varieties in this class do have a tendency to cluster, they, for the most part, have individual stems which are long enough for cutting and are excellent for exhibition purposes.

Grandifloras that are recommended include:

1. Queen Elizabeth	Medium Pink	All-America in 1955
2. Carrousel	Dark Red	
3. Montezuma	Orange-Red	
4. Starfire	Currant-Red	All-America in 1959
5. Roundelay	Dark Red	
6. El Capitan	Medium Red	
7. Pink Parfait	Pink Blend	All-America in 1961
8. Golden Girl	Medium Yellow	
9. John S. Armstrong	Dark Red	All-America in 1962
10. June Bride	White	



Photo courtesy of American Association of Nurserymen

TIFFANY



Photo courtesy of American Association of Nurserymen

MONTEZUMA

Floribundas are low growing bushes on which the blooms are in clusters, and are used effectively in borders or hedges or where a mass planting is desired.

Floribundas recommended include:

1. Fashion	Pink Blend	All-America in 1950
2. Spartan	Orange-Red	
3. Frensham	Dark Red	
4. Vogue	Pink Blend	All-America in 1952
5. Red Pinocchio	Dark Red	
6. Eutin	Dark Red	
7. Ivory Fashion	White	All-America in 1959
8. Floradora	Salmon-Rose	All-America in 1945
9. Dagmar Spath	White	
10. Betty Prior	Medium Pink (5 petals)	
11. Else Poulsen	Medium Pink	
12. Jiminy Cricket	Orange Blend	All-America in 1955
13. Circus	Yellow Blend	All-America in 1956
14. Little Darling	Yellow Blend	
15. Independence	Orange-Red	
16. Permanent Wave	Medium Red	
17. Fusilier	Orange-Red	All-America in 1958
18. Ma Perkins	Coral-Pink	All-America in 1953
19. Sarabande	Orange-Red	All-America in 1960
20. Fire King	Orange-Red	All-America in 1960

Four roses were chosen as All-America Selections by the committee for 1962. The most outstanding one appears to be Kings Ransom, a golden yellow hybrid tea with rather long pointed buds which open into high centered blooms. This is a very attractive and worthwhile rose. The bush is a vigorous upright plant about 3½ to 4 feet tall, and has excellent glossy foliage which appears to be disease resistant. This rose is recommended as a *must* rose for those who like a yellow rose.

Christian Dior: This beautiful medium red hybrid tea rose is about 3½ feet high and has large well formed blooms with many petals which hold up well in the sun. Up to date, this rose is a rather sparse bloomer and although the foliage is satisfactory it appears to be subject to some mildew. As we now have so many fine new red roses I do not recommend this rose as one to get too excited about.

John S. Armstrong: This dark red rose ranges from 3 to 3½ feet in height and is rather small for a grandiflora. The blooms have a good red color, are double, and when fully open are rather flat. Most of the blooms are on individual stems which are fine for cutting and rose show purposes. The foliage is good and appears to be disease resistant. This rose, in my opinion, is not in the same class with Carrousel, El Capitan and Starfire, all of which are considered superior.

Golden Slippers: This floribunda is undoubtedly the poorest of the 1962 selections. The bush is very small and so far in Colorado has been a very sparse bloomer. The buds are a brilliant red, orange and gold and are very attractive, but the full-blown orange rose fades badly and is nothing to rave about.

Two roses have been selected as having the necessary qualifications for All-Americas for 1963. Both are hybrid teas. The first one is Royal Highness which is a large shell pink rose with high centered blooms on long stems. This rose is a cross of Peace and Virgo and has many of the characteristics of Peace. A number of reports indicate that the bush is susceptible to mildew. As the rather fragmentary reports received to date are not entirely satisfactory it is suggested that the selection of this rose for Colorado growing be de-

ferred until more complete reports are received.

The second rose selected for 1963 is Tropicana. This beautiful and outstanding fluorescent orange-red hybrid tea is recommended as a *must* rose for all Colorado gardens. It ranges from 3½ to 4 feet tall and is a vigorous compact bush with fine dark green foliage. It has many good sized blooms which are borne on sturdy stems and which do not fade. The blooms, whether on the plant or cut for the house, last from 6 to 8 days. It is a very disease resistant rose and in the Denver Botanic Gardens where it was surrounded by roses covered with mildew it came through without being affected. This rose seems to have everything a good rose should have and, in my opinion, will crowd Peace for top rating honors.

One other rose which seems to warrant consideration at this time is the hybrid tea South Seas. This attractive coral-pink rose is a good bloomer with double flowers and has petals with good substance which should make it a good exhibition rose. The bush is about 4 feet tall, has excellent dark green foliage and early reports indicate it is



Photo courtesy of American Association of Nurserymen

QUEEN ELIZABETH

disease resistant and should do well in Colorado.

Although many new climbing roses have been introduced in recent years, most of them do not seem to have the hardiness to withstand one of our really tough Colorado winters.

The three most popular climbers for this region still appear to be:

1. Improved BlazeMedium Red
2. New DawnLight Pink
3. Paul ScarletMedium Red

The first two are everblooming and normally bloom three times each season, whereas the Paul Scarlet is limited to one burst of blooms in the early summer.

Other climbers that give promise of being able to withstand a moderate Colorado winter include: Spartan, an orange-red; Don Juan, a dark red pillar; Gladiator, a medium red; Doubloon, a medium yellow; and High Noon, a dark yellow.

Regarding all classes of roses in general, my advice to the novice rose grower is to purchase the older recommended varieties and have fewer disappointments. However, for the past 2 years I have been growing, and watching others grow, the hybrid tea rose Tropicana and I am confident this rose will give satisfaction if planted in your yard in 1963.

Heigh Ho!

Plan for the Plant Sale in May !!!

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Royal Highness

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Mr. OPPE

Joins Our Staff

ON JANUARY 2, 1963, Mr. Joseph W. Oppe joined the staff of the Denver Botanic Gardens as Botanist-Horticulturist. He will edit *The Green Thumb* magazine and will also assist generally in the work of the Gardens.

Mr. Oppe is a native of Ohio. He has served 4 years in the U. S. Navy. For the past 3 years he was Assistant Superintendent of the Dawes Arboretum in Newark, Ohio.

Mr. Oppe is experienced in both eastern and western botany, having a Bachelor of Science Degree in Botany from Marietta College, Marietta, Ohio, and a Master of Science Degree in Botany from the University of Idaho. He has done additional graduate work



toward his doctorate at the University of Pittsburgh.

Joe and his wife, Freda, are living at 5350 East Asbury St. Mrs. Oppe is employed by State Farm Insurance.

Yes,

we have a ranch near Dillon where we are building a new home, but we will still operate the Cottonwood Garden Shop another season.



We have a great assortment of rare and unusual plants growing in the nursery and we are getting in from the very best growers some of the nicest trees, shrubs and evergreens that we have ever had. We will still have a very complete assortment of the finest perennials for this area. We will have all the new roses and most of the old from the best growers in the United States. We will still be able to give you the same accurate advice about the proper plant for each situation as we have been doing for the last 30 years.

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Landscaping...

"WHERE TO TURN NEXT" JULIA H. ANDREWS

HELPING A NEW homeowner start planting on his property is not a subject for generalizations. Each home and each personality make it a very specific discussion. Of course, you want to know what *you* should do. This article will not attempt to tell you how to do it but it will tell you where you may obtain help.

This region has a climate that can be extreme. This past fall was hot and dry, enough to force lilacs into full bud. Then the temperature slid to sub-zero with no intervening time for plant material to prepare itself. Hot days, cold nights, a burning winter sun and alkaline soil are some of the factors that make it difficult for most plant material, not native to this region, to prosper. I am sure you have heard this and are confused. "Where to turn next" is your plea.

If you have bought property in a new area, a nursery salesman probably has knocked on your door. If he represents an out-of-state firm and offers plants at lower prices than any local nursery, be certain the varieties will grow here and are acclimated to our area. For example, there are many varieties of ash trees but only the green ash and white ash have proved their resistance to the extremes of this climate.

Many of the local nurseries send salesmen door-to-door. I am sure they would show you their stock if you wish. Don't be misled by elaborate guarantees. There is an old maxim that they are only as good as the company that offers them. This is particularly true in sales of plant material.

Some of the nurseries in the Denver area offer planning services with the

sale of plant material. They will draw a sketch showing where the plant material is to be located. It will help you to visualize the actual effect and this will help you to know if it is what you desire.

One of the local nursery catalogues might be helpful in identifying the plant material. In the Art and Architecture section of the Denver Public Library are many books on the subject of home improvement and beautification as well as on the more complex subject of landscape architecture. In the Botanic Gardens House at 909 York Street the Helen K. Fowler Library contains many books and magazines on gardening and growing plant material. Another source is the Horticultural Extension Service, Colorado State University, Fort Collins. An inquiry for their list of publications would be the most convenient way to find their pamphlets on home beautification. The Denver County Agricultural Agent can also help you with specific problems.

As a new homeowner you may want a more complete range of planning and design services, especially if there are difficult problems of terrain or drainage. A qualified landscape architect could serve you best in this capacity. The telephone directory lists members of the American Society of Landscape Architects practicing in the Denver area. An appointment with a landscape architect to discuss his services, how they could be of value to you, and his fees is the normal way to approach this source of help.

I hope these sources of information will help you, the new homeowner, know "where to turn next!"

Versatile Vegetables

MRS. JOHN SCOTT

GARDEN VEGETABLES are every bit as pretty as flowers and more unusual. They are also edible — that is, if some can be saved from your efforts at designing (commonly called flower arranging regardless of the material used).

Vegetables can be used in the same manner as other garden plants, for bedding, framing, accenting and cutting. Because many ornamental vegetables are annuals, they are especially valuable for temporary landscaping effects. The foliage of most vegetables is very attractive. Root-crops, such as beets, carrots, parsnips and turnips, have interesting leaves. Most vegetable foliage is abundant and uniform, but the flowers and fruits are generally small in proportion to the overall plant.

The proportion of your plot that you can use for additional plantings may govern your choice of vegetables. Cucumber, pumpkin, squash and melon

(both musk-and water-) vines cover a lot of area, unless they are trained on upright supports such as trellises, fences, and walls. Neither the foliage nor the flowers of these vines keep well for me when cut. But the baby fruits are enduring and priceless. Cute cucumbers arranged in clusters like grapes, and the other cucurbit fruits in miniature, make never-to-be-overlooked designs with long-lasting qualities.

Vegetables are reputedly long-lasting. To clean, wash in cold water. Most kinds (but not all) should then be immersed in cold water for several hours, after which they are kept in the refrigerator until needed for arrangements.

Today's string beans are an arranger's rainbow with a pot of shelled beans (for soaking and stringing and looping through the design) at the rainbow's end. String beans come in a variety of colors, sizes and shapes. The yard long or asparagus varieties are green and 18 to 20 inches long. The pencil pods and flats are found among both the old-fashioned green string beans and the yellow wax ones. Two newcomers, one with blue and the other rich violet pods, lose their exotic colors after boiling three minutes—a canning aid. But, of course, as flower arrangers we use our vegetables fresh. The bansei variety of soybean grows on a stiff stalk and makes good line material.

A cultural aid is to grow all of one family, say the cabbages, in one immediate area. Then you can conveniently wash the cabbage worms off all at once, usually weekly or even more often, depending upon how many white butterflies are flitting around laying eggs.

Included in the cabbage family are ordinary cabbages, both green and red, and also savoy cabbage with crinkled and rumpled leaves; ordinary cauli-





flowers and purple headed ones too; kohlrabi, for sprightly and clownish designs; Brussels sprouts — line material again; and broccoli, usable at various growth stages. Ornamental kale — edible but usually not eaten — also belongs here.

Ornamental Swiss chard and the decorative corns should also be grown. The latter have foliage rivaling rare, tropical plants: quadricolor, dark green leaves striped with pink and white; harlequin, striped with red; gracillis, a lighter green with pure white stripes. All the ears are colored, some variegated, others solid. Strawberry popcorn is a quite edible ornamental, its flavor having been retained, not sacrificed, to decorative appeal.

Peppers in a combination of colors and contours are on the flower arrangers must list. Pepper foliage is also lovely and pepper plants make acceptable house plants.

Tomatoes are listed under the novelties. The Tiny Tim variety is recommended for house plants or window box culture. I like little yellow pear tomatoes that grow in clusters. So far I've found them disease and bug free, perhaps a happy coincidence.

Okra and eggplant are two of my standbys. Both are attractive in color, form and texture. The okra is upright and the eggplant bushy. The blooms on both are exquisite miniatures.

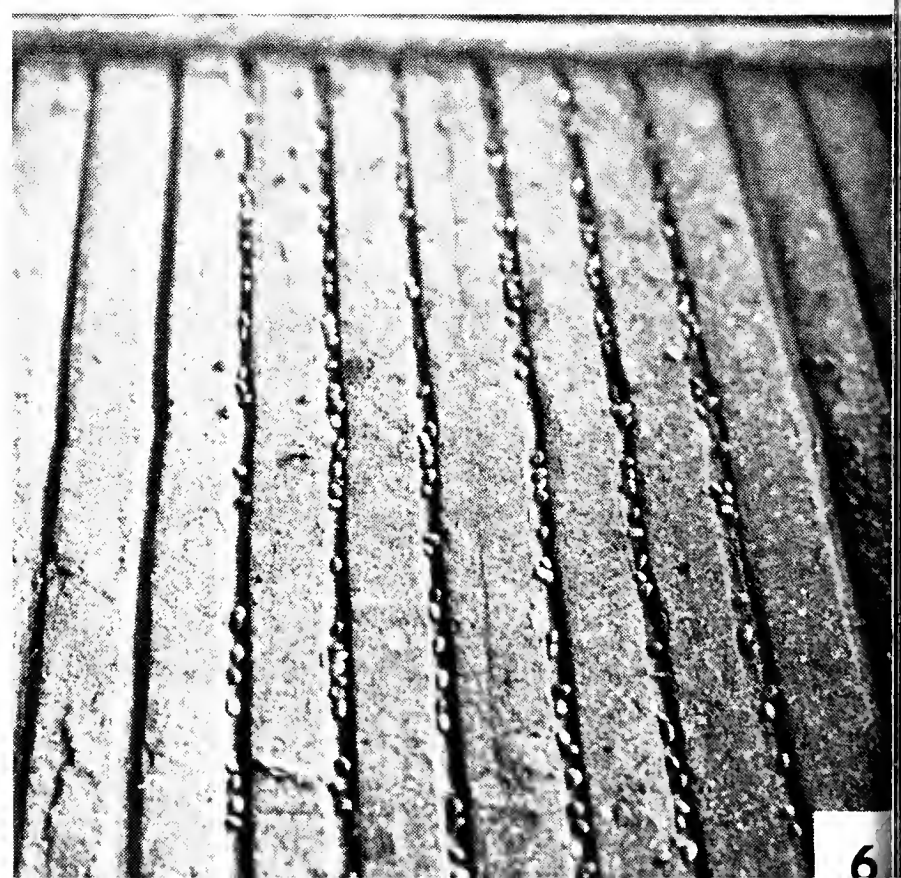
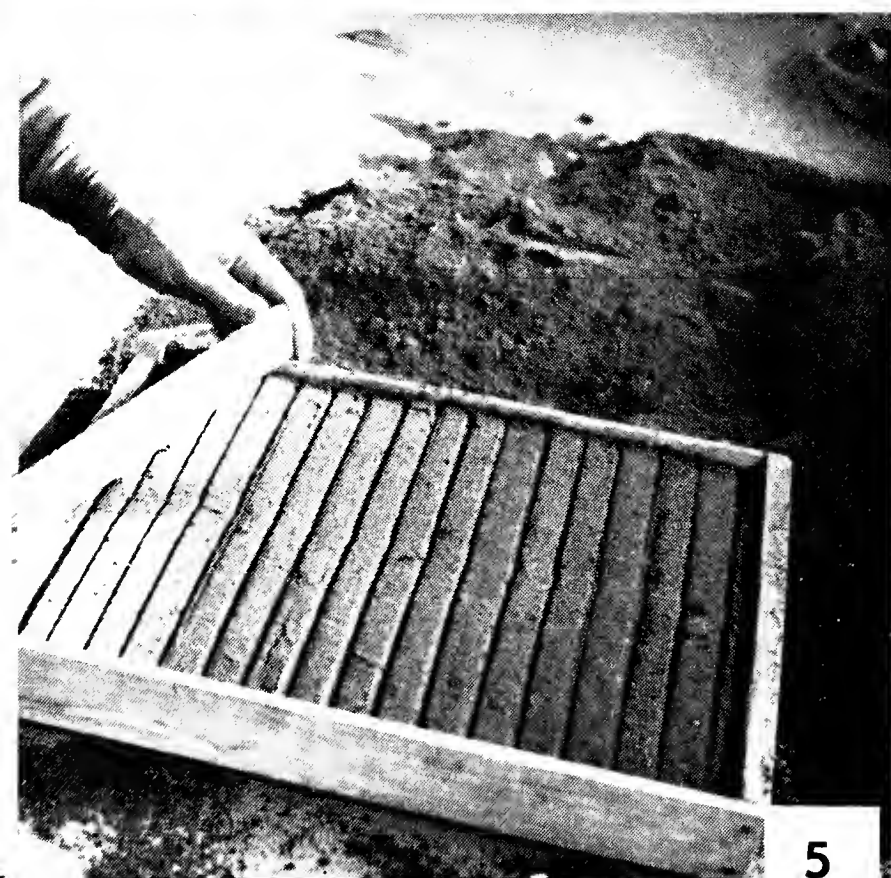
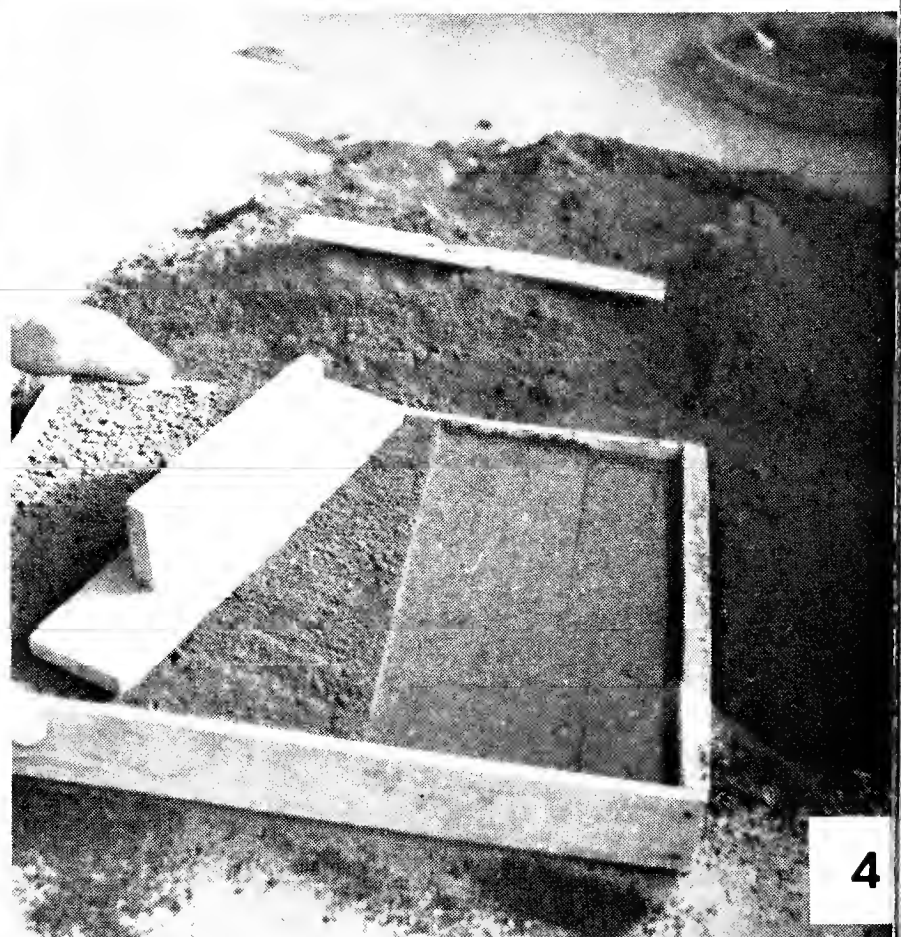
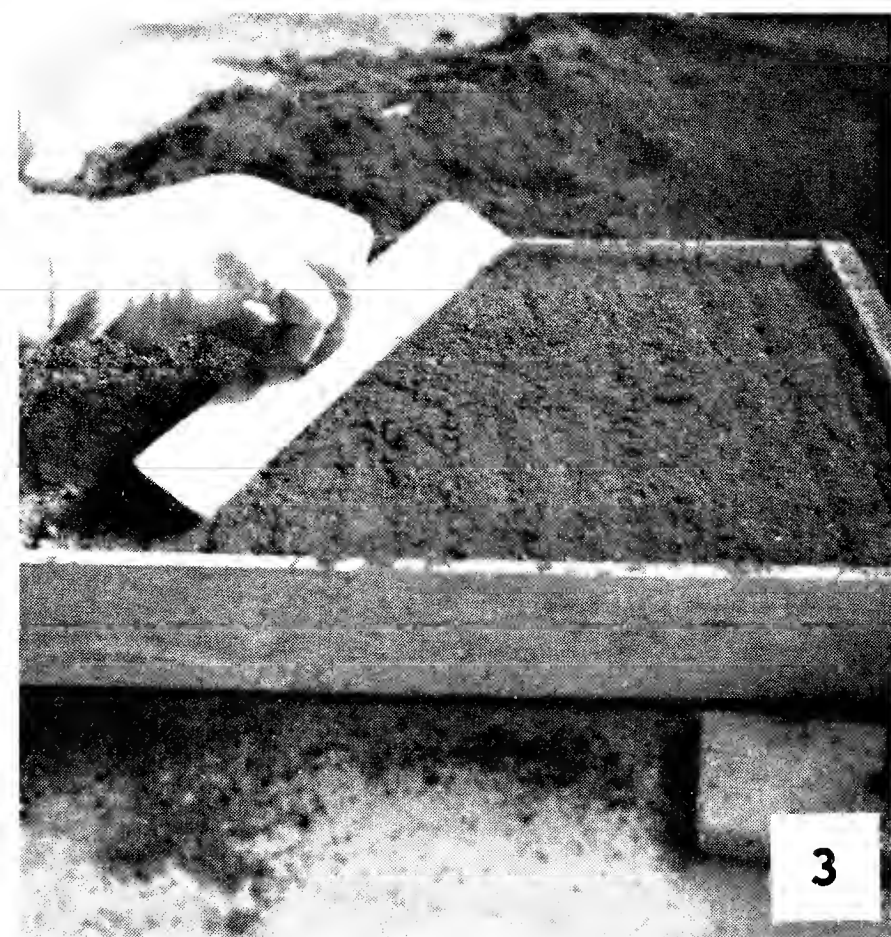
Colorwise, the red onion is tops for decorative purposes, swags in particular. But onions, whether yellow, brown or white, and some other vegetables can be purchased, saving the garden space for those vegetables which are not mature, or marketable. For foliage and flowers of vegetables you will have to grow your own. The perennial onion varieties that supply us with early spring onions and later form such unusual seed heads are worth raising at home.

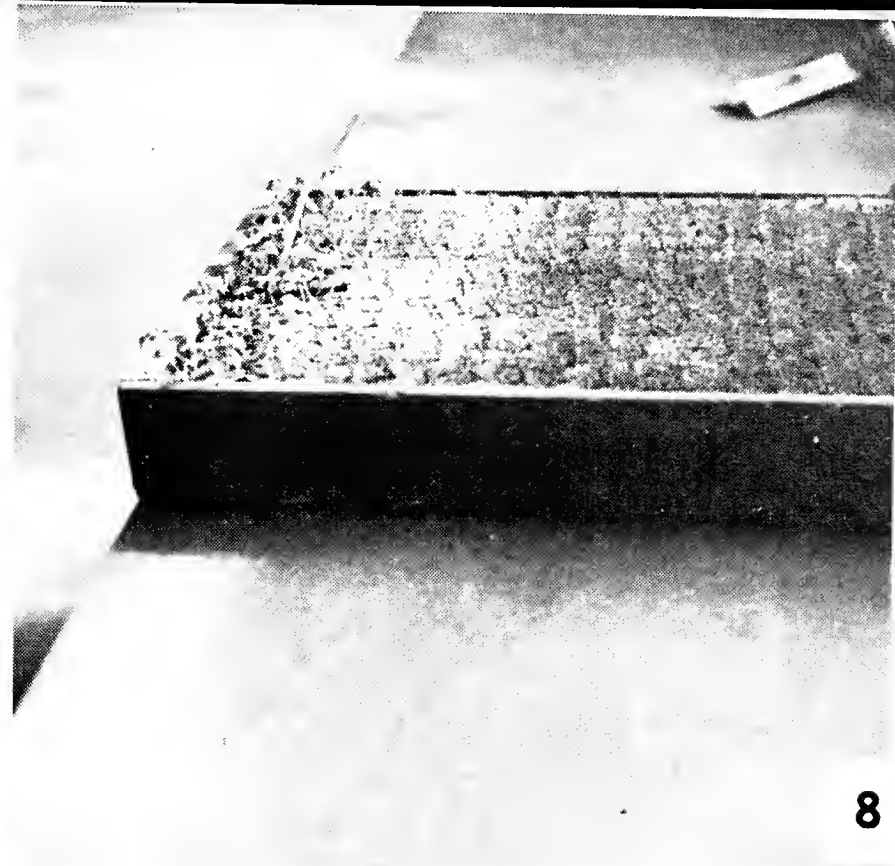
Most of these vegetables will have to be grown from seed. Some cannot be obtained locally, but can be ordered from seed catalogs. The hardy ones can generally be planted out in the open early in March, weather permitting. Such early-seeded ones include: onions; root-crops; lettuces, (which make versatile arrangement material); peas, which offer a different form and texture (drip peas like raindrops through a design); spinaches and chards, rich textures and different design forms — chard for modern. When danger from frost is minimized, plant okra, beans, corn and the 'vines'.

Plants of cauliflower and eggplant are always available and some of the cabbages, depending upon how practical versus ornamental they are. Any or all of these may be started indoors in flats if preferred.

Some vegetables make nice dried designs. Leaves from broccoli, cabbage, cauliflower and kale dry to warm tans or delicate mauves. Okra, if picked early, is a clear, chartreuse-green. You may have used artichokes, but do buy several sizes for gradation.

You'll discover other surprises. Have fun, and don't eat all the vegetables!





Starting Seeds Indoors



HELEN MARSH ZEINER

STARTING SEEDS indoors can be a very satisfying experience for the person who loves to see things grow. However, it does require space by a sunny window, a cold frame, or a greenhouse and the seedlings must have care. For the person who needs only 6 tomato plants, it is hardly a recommended practice; but for the person who uses large numbers of bedding or vegetable plants, it is well worth the time and trouble involved.

In addition to the pure pleasure of watching the miracle of the green shoot springing from the seemingly dead seed,

there are certain practical advantages to starting seeds indoors. If you use many plants, starting them yourself is cheaper than buying the plants. Secondly, in our climate with its late frosts, plants started indoors make it possible to have blooms much earlier than when the seeds are planted directly outdoors.

There are also certain disadvantages, mainly that it *is* trouble and does require a considerable amount of space in a suitable location.

Seeds are usually started in flats, which are simply shallow boxes made of thin boards. A rather standard and convenient size flat is about 14 inches by 18 inches by 2½ inches deep. However, a flat can be of any shape and the depth may vary to about 4 inches. If you make your own flats, they can be made to fit a window sill or other available space. One can use flat plastic containers in which plants are sometimes sold, or shallow flower pots, or

KEY TO PHOTOS

1. Place newspaper in the bottom of the flat to keep the soil from washing out.
2. Fill the flat with prepared soil.
3. Level the soil.
4. Tamp to firm the soil.
5. Make rows with the edge of a board or a ruler.
6. Seeds in rows. Note size of seed in relationship to depth of row.
7. Cover seed and water with a fine spray.
8. Rows of seedlings ready to be thinned out.

waxed paper containers such as cottage cheese cartons. Almost any shallow container will do — even an old pan, if you will punch a few holes in the bottom for drainage. Plant bands are often used within a flat to permit easy separation of plants. They can be bought from your seedsman, or you can make your own from waxed paper cartons.

If seeds are started in flats, the seedlings may be transplanted to other containers such as the waxed paper cottage cheese carton or cut-off milk cartons. Plants in these containers can be transplanted into the garden with little disturbance to the roots, since the container is easily peeled away.

After the flat is obtained, the next step is to prepare the soil. A light soil is best. It can be a potting mixture such as you would use for house plants. This may be bought in small sacks or prepared at home from equal parts of loamy soil, peat and sand or vermiculite. It should be screened or well-mixed with the hands to remove all clods. Vermiculite or perlite make good rooting media, but the young seedlings will require feeding about once a week with a weak solution of fertilizer.

Put a piece of newspaper in the bottom of the flat to keep the soil from washing out. Have the soil moist. Fill the flat, then use a small board or a ruler and level the soil. Tamp to firm the soil, but do not pack it. Using the same board or ruler, make shallow rows by pressing the edge of the board into the soil. If the seeds are very small (for example, petunia), make very shallow rows or scatter the seeds. For larger seeds, make deeper rows. Very small seeds should be covered lightly if at all. They may be pressed very lightly into the surface of the soil. Larger seeds are covered to a depth about equal to the diameter of the seed.

Water carefully, using a clothes sprinkler or fine spray. The watering must be gentle in order not to wash the seeds out of place.

Label carefully, especially if you plant more than one kind of seed in each flat.

The flats should be kept moist and warm until the seeds have sprouted. Day temperatures of 75-80 degrees F. and night temperatures about 65-70 degrees F. are advisable. To prevent drying out, cover the flat with glass or clear plastic. This usually cuts down evaporation enough so that watering is not necessary until the seedlings appear. There should be some ventilation, so remove the cover a little while each day or prop it up at one edge. Holes may be punched in the plastic cover to allow some ventilation and still reduce water loss.

After the seedlings appear, they should be handled much like house plants and should be allowed to dry out between waterings. The seedlings may need some shade if the window in which they are placed is a hot window. A piece of newspaper serves very well for this purpose.

Once the seedlings are well up, they will need thinning. This must not be neglected or you will have spindly, unhealthy plants. If the number of seedlings makes it feasible, it is a good idea to transplant them to other containers such as the previously mentioned dairy products carton. Plants removed in thinning, if removed with care, may be potted in this way.

Before transplanting into the garden, harden the young plants by putting them outdoors in the sun during the day and bringing them in at night. Start with a very short exposure, and gradually increase the time until they are out all day.

By starting seeds in March, you

should have good plants to put out in the garden by the latter part of May.

Many annuals can be started in this way. Among those most commonly started indoors are petunias, salvia,

verbenas, snapdragons, marigolds and zinnias. For the vegetable garden, you may wish to start tomatoes, peppers, eggplant, cabbage, cauliflower or broccoli.

MAKING COMPOST

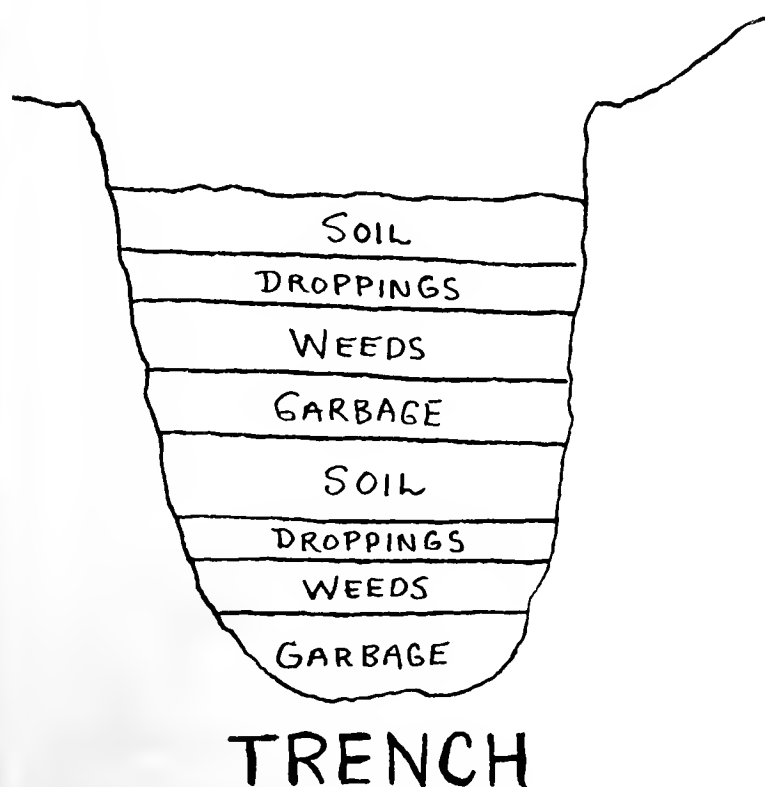
MRS. JOHN W. NEWMAN

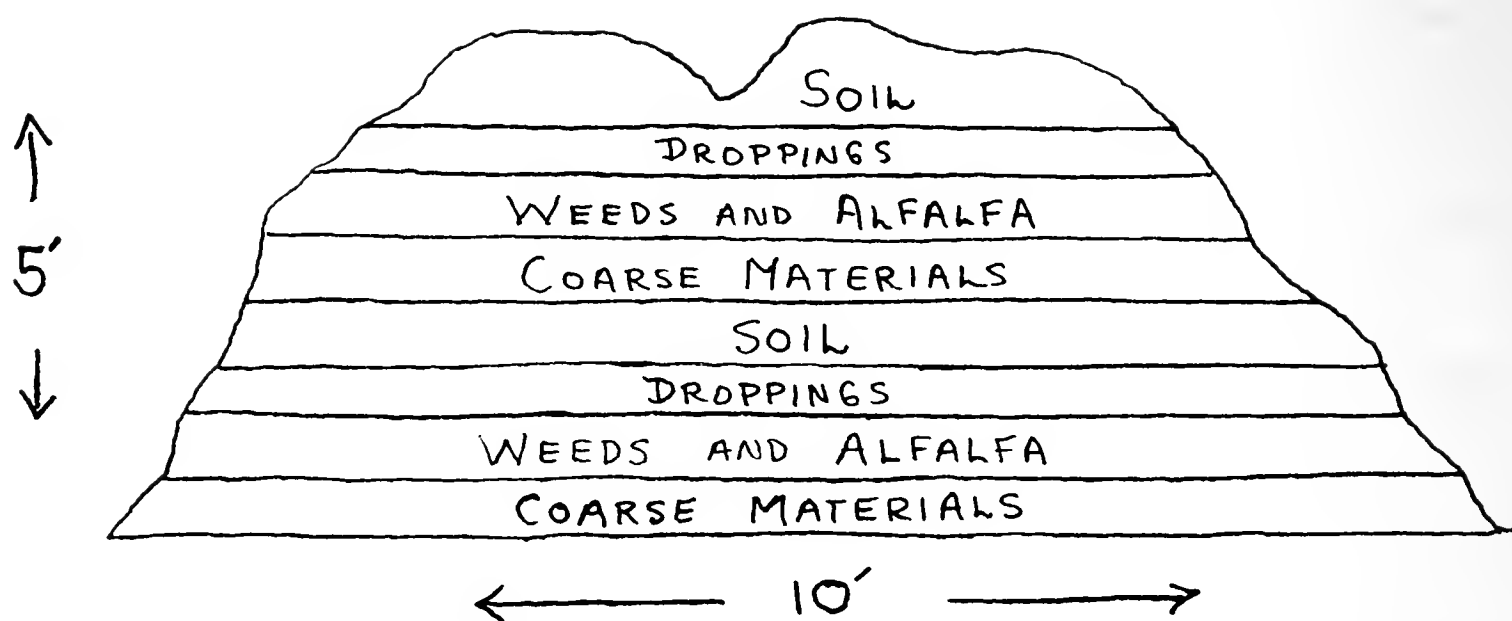
WE TRIED THREE methods of composting. The method you use will depend on the size and arrangement of your yard.

If you have a small garden planted in rows, the following method is very successful. Start by digging a trench between two rows. Each day put into the trench the garbage from the house (except fat), and the weeds you have pulled if they have not gone to seed or are not diseased. If you have chickens as we did, put a small fire shovel of droppings on the weeds, cut in with a spade and cover with a few spadefuls of soil, leaving a hole for the next day's garbage. A small amount of bone meal

may be added from time to time. The next year alternate the rows so that you plant where the path (and the compost trench) was, and you will be surprised at the growth of your plants.

When we disposed of our chickens and gardened our entire eight lots, we made compost piles. You may prefer this method of composting if you have sufficient space. On the bottom of a rectangle about four by ten feet, put the coarse materials. On these put about six inches of weeds and cut alfalfa if you have it. Any of the legumes are good as they add nitrogen. On this put about two inches of animal droppings (we had access to the droppings of a goat dairy) followed by a layer of soil. Repeat this process until the pile is about five feet high, ending with soil all over the top and sides. Have a small depression in the top of the pile for catching moisture. Make a few holes with an iron rod down through the pile for air. Keep the pile moist but not soggy. In from five to seven weeks it is ready to turn. Put the top and sides in the bottom of a new pile and leave for a short time. Then screen the compost into a wheelbarrow, using the coarse material that did not go through the screen for the bottom of a new compost pile. An activator may be added to the compost to hasten decomposition. Dehydrated barn yard ferti-





PILE

lizer can be obtained from feed stores if fresh is not available. You may also add a good commercial fertilizer if you so desire.

As the neighborhood built up we put the compost piles in a loose-walled bin made of cinder blocks. This did not have to be turned as air circulated between the blocks. It took a little longer for the material to be available for the soil but was better looking for the neighbors.

If the last layer is always soil there will be no offensive odor. In the center of the piles the temperature will reach 160° F. destroying all the weed seeds in the compost. However, that does not

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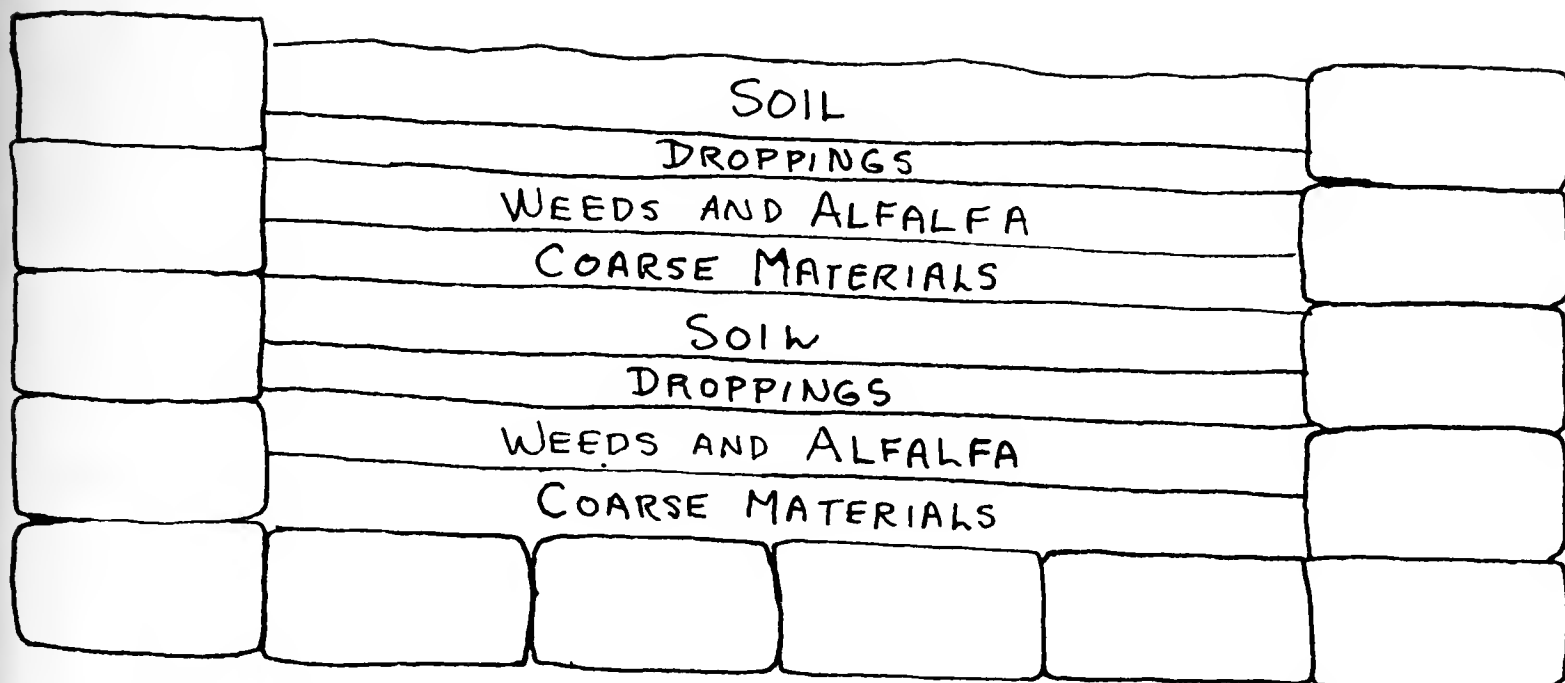
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mean that you will have no weeds in the garden for nature sees to it that you will.

If you so desire, you may add a little ammonium sulphate or ammonium nitrate or commercial fertilizer to the compost piles as you build them — but

organic gardeners prefer not to add anything that is not organic in nature.

Soils in this area are benefited by the addition of compost or organic material, and the home gardener will find the making of compost a very worthwhile project.

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HAIRY AND OTHER SURFACES

IF YOU HAVE ever tried to describe the hairiness of a leaf you'll wind up in a maze of intricate distinctions, such as woolly-hairy, stiff-hairy, silky, felty, short-haired and what not?

Botanists have gone through the same difficulty; by this time they have adopted a number of botanical names to help out. The following names are examples:

Prunus tomentosa has leaves densely clothed with woolly or cottony hairs.

Sambucus pubens is hairy elder.

Chrysopsis villosa — clothed with long, soft hairs.

Phacelia sericea — clothed with satiny pubescence.

Viburnum lantana has woolly hairs.

Thymus lanuginosus — gray-woolly.

Veronica incana is white-woolly;

Santolina incana likewise.

Amorpha canescens has a hoary, grayish pubescence of short hairs.

Hymenoxys lanata has densely-woolly leaves and flower heads.

Betula glandulosa has sticky-glandular leaves.

Aster laevis — Smooth aster.

Rhus glabra — Smooth sumac.

Mimulus glabratus — Smooth monkeyflower.

Artemisia glauca — covered or whitened with bloom that rubs off.

Ribes cereum has waxy fruit.

Sometimes the "hairy" designation is placed in front of a plant name. Thus *Eriogonum* means woolly knee and *lasiocarpa* has hairy fruits. Again, if the characteristic is exceedingly prominent, it may be supplied with an *-issima*, as in *Clematis hirsutissima*.



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Things To Do In

MARCH

HELEN MARSH ZEINER

THERE WILL BE warm days in March when you can satisfy that urge for gardening by improving the soil. Our soils are lacking in humus, so that the addition of organic matter such as peat, manure, compost or leaf mold is beneficial. This is true whether the soil is clay or sand. The organic matter can be spread on the surface, spaded in as weather permits and left to mellow until planting time. If you are planting a new lawn, use 2 yards of manure per 1000 square feet, plow or spade in to a depth of 8-10 inches and mix well. Rough grade now, but wait until the middle of April to seed. In flower beds or vegetable gardens, cover the soil with 1-2 inches of organic matter and spade in, mixing well.

Clean-up and remove trash, but *don't* remove mulches yet. Don't be fooled by the first warm days — March is a changeable month and those mulches will still be needed.

Transplanting of shrubs and trees can be done whenever the ground is workable. Slow-growing trees such as birch, honeylocust, hackberry or hawthorn should be transplanted just before they break into leaf. Evergreens in a ball of earth can be moved now.

Bare-root nursery stock may be planted towards the end of the month. Be sure to dig a large hole — roots should be spread out and not crowded. Dig the hole larger than you will actually need, mix peat or compost with some of the soil you removed and use this as a back-fill.

Rhubarb and asparagus should be

transplanted now. Bleeding hearts and peonies should be moved now while they are dormant.

St. Patrick's day is the traditional time to plant sweet peas, but a few days before or after is just as suitable a planting time. They should be planted about 3 inches deep in a well-prepared bed. Garden peas can be planted late in March.

If you start seeds of zinnias, marigolds, cosmos or scabiosa now they will be ready to set out Memorial Day. Tomatoes and peppers can be started now. Seeds may be planted in flats in the house or in cold frames. (See *Starting Seeds Indoors*, page 71.)

If you did not arrange earlier for dormant spray for scale on elms and other trees, it is still not too late. Evergreens should also be checked for scale, as well as shrubs such as the lilac and cotoneaster.

Nursery stock may arrive when the weather is not suitable for planting, especially if it is coming from another section of the country. If possible, heel-in the plants in unfrozen soil south of a building. If this is not possible, unwrap the tops but keep the roots covered and moist. Keep in a cool place. This should keep the plants until weather permits planting.

Remember to refer to back issues of *The Green Thumb* for many fine articles of seasonal interest.

Heigh Ho!

Plan for the Plant Sale in May! !

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The Green Thumb

A Publication of Denver Botanic Gardens

APRIL

1963

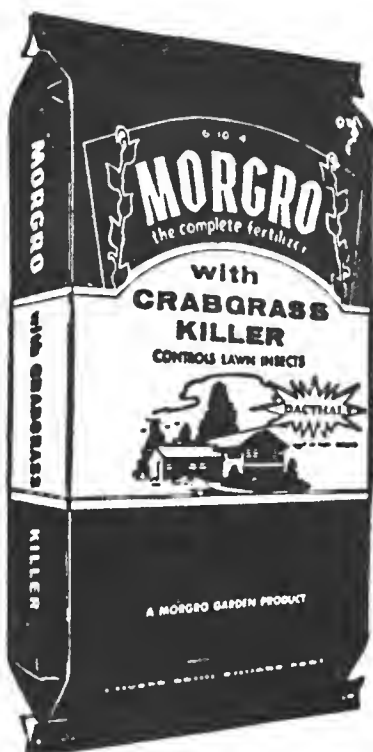


EVENING PRIMROSE, *Oenothera albicaulis*

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APRIL

Vol. 20

No. 3



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THE COVER

EVENING PRIMROSE, *Oenothera albicaulis*

Original drawing from the Emma A. Ervin collection.

CALENDAR of EVENTS

Every Saturday Morning — 9:15 a.m., KLZ Radio
The Green Thumb Program, Herbert Gundell, Denver County Agricultural Agent

Every Saturday Afternoon — 3:30 p.m., KLZ-TV, Channel 7
The Weekend Gardener, Herbert Gundell

AT THE BOTANIC GARDENS HOUSE

APRIL

- 17 — Wednesday, 9:30 a.m., Fun With Flowers Workshop
- 18 — Thursday, 10:00 a.m., Around the Seasons Club
- 20 — Saturday } African Violet Show, 12:00 noon to 5:00 p.m. Public invited. No admission charge.
- 21 — Sunday }
- 24 — Wednesday, 12:00 noon, Civic Garden Club, Division A, Luncheon Meeting
- 7:30 p.m., Landscape Contractors
- 26 — Friday, 1:00 p.m., Ikebana International Japanese Flower Arranging Class

MAY

- 1 — Wednesday, 7:30 p.m., Botany Club
- 2 — Thursday, 7:45 p.m., Orchid Society

- 3 — Friday, 1:00 p.m., Civic Garden Club President's Tea
- 6 — Monday, Denver Botanic Gardens Junior Committee
- 7 — Tuesday, 8:00 p.m., Scroll & Pen Club, Dr. Hildreth, Speaker
- 8 — Wednesday, 7:30 p.m., Landscape Contractors
- 9 — Thursday, 7:30 p.m., Rose Society
- 11 — Saturday } Annual Plant Sale, all day
- 12 — Sunday } both days
- 13 — Monday, 10:00 a.m., Judges' Council
- 14 — Tuesday, 10:00 a.m., Herbarium Study Group
- 14 — Tuesday } Flower Show School
- 15 — Wednesday }
- 16 — Thursday } 10:00 a.m., Around the Seasons Club

A REMINDER — Arbor Day is Friday, April 19th — plant a tree!



Notes and Notices

8TH ANNUAL STERLING BOWL TOURNAMENT sponsored by Jackson and Perkins will take place June 26th in Newark, New York. Mrs. John Scott, Kibitzers Garden Club, is the only entrant in the Rocky Mountain area who met with the necessary qualifications to compete in this tourney. She receives an all-expense paid trip and promises to do her best to bring the Sterling Bowl back to Colorado.

ARBOR DAY — APRIL 19th. There will be a tree planting ceremony at Denver Botanic Gardens, 909 York Street, at 9:00 a.m. Civic Garden Club.

Your membership in

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entitles you to these things:

- THE GREEN THUMB, Colorado's only garden magazine, written for the Rocky Mountain region by experts in their fields.
 - Use of Botanic Gardens House for flower shows, classes, study groups, and other meetings pertaining to horticulture or botany.
 - Use of the Helen Fowler Library at Botanic Gardens House.
 - Use of the Kathryn Kalmbach Herbarium at Botanic Gardens House.
 - Answers to your garden questions on flowers, shrubs, trees, and lawns.
 - The benefits of the research work performed by Botanic Gardens' staff.
- Your membership also benefits your state, your city, and your community.

.....
Heigh Ho! Plan for the Plant Sale in May!
.....

Books and Booklets For Sale

The following publications are available for purchase in the office at Botanic Gardens House, 909 York Street:

Around the Seasons by S. R. DEBOER.....	\$1.00
Colorado Evergreens by ROBERT E. MORE.....	2.50
Colorado Wild Flowers by HAROLD and RHODA ROBERTS (a museum pictorial).....	1.25
Fruit Key (identification of plants by their fruit) by WILLIAM HARLOW.....	.60
Handbook of Plants of the Colorado Front Range by WILLIAM WEBER.....	5.00
How to Grow Good Gardens in the Sunshine States by GEORGE KELLY.....	3.00
How to Identify Plants by H. D. HARRINGTON and L. W. DURRELL.....	1.45
Meet Flora Mexicana by M. WALTER PESMAN, three-color:	{ Wir-O-Bound, thin card.. 5.00 Vinyl cloth on boards.... 6.00 Thin card cover 4.00
Meet the Natives by M. WALTER PESMAN.....	{ Regular 3.00 Spiral 3.60
Mountain Wild Flowers of Colorado by HAROLD and RHODA ROBERTS (a museum pictorial).....	1.25
Planning for America's Wildlands by ARTHUR H. CARHART.....	2.50
Plants of Rocky Mountain National Park by RUTH ASHTON NELSON.....	1.10
Saga of a Forest Ranger by LEN SHOEMAKER.....	5.00
The Secret of the Green Thumb by HENRY and REBECCA NORTHEN.....	5.00
Twig Key (identification of trees and shrubs in winter) by WILLIAM HARLOW.....	.60

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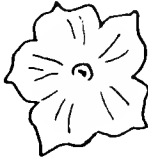




A mimeographed partial list of the flowering plants of the Mt. Goliath Alpine Garden Trail Area, compiled in 196240
Green Thumb folders, will hold one year's issues	each .25
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ANNUAL PLANT SALE



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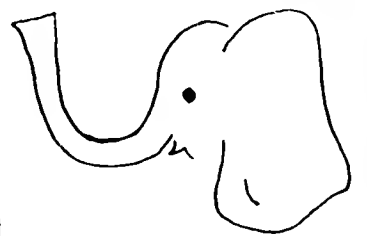
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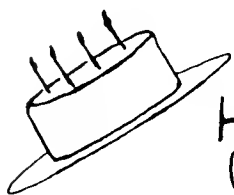
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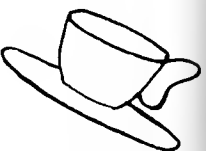
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RAFFLE - AUCTION (4 p.m. - 6 p.m. - May 12) ONLY
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PLANT SALE CHAIRMAN - ROBIN LONG: TA5-1992

May Plant Sale

ROBIN LONG

A GAIN THIS YEAR the Denver Botanic Gardens is planning a very colorful plant sale to be held in May. Special effort is being made to secure the finest quality nursery stock, home grown plants and many unusual plants such as those already under test by the Denver Botanic Gardens.

Selection will be made easier by the grouping of shrubs, trees, annuals, perennials, herbs (including tomatoes and peppers), orchids, cacti, African violets and border plants. Many of these plants will be very unusual and in some cases new to Denver.

Your attention is called to placing special advance orders. If you would like to have a certain number of any special plant or shrub, you should place an advance order and every effort will be made to secure them for you. Call Clyde Learned, 777-9490, Mrs. Fran Morrison, 424-0706 or Mrs. Robin Long, 825-1992 to place your orders. Clyde has a real "neighbor stopper," a new white petunia named Seafoam.

Reminiscent of the carnival days, there will be additional booths with

food goodies "fit to be tried" and with antique items. Special excitement will be provided by a double raffle including prizes of a bouquet-a-month, gold jewelry, a jasmine mink collar — on one raffle; garden statuary, a 6 foot blue spruce, 5 yards of peat and sheep — on the other. These raffles will be held during the windup auction, the last two hours of the final day. You need not be present to win.

Naturally, your cooperation is needed in donating special plants you may have in your home greenhouse or garden. See list of persons to call, elsewhere in this issue.

Because of the fine cooperation already shown, those of us working on this sale are already as "optimistic as a seed catalogue." We are sure you will all get behind this important event for the betterment of Denver Botanic Gardens and make it a big success. Support and attend the Annual Plant Sale, Saturday and Sunday (Mother's Day), May 11th and 12th, 1963, from 10:00 a.m. to 6:00 p.m., at Botanic Gardens House, 909 York Street, Denver.

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Our Backyard Greenhouse

JEAN AND JACK FLECK

FOR THE average gardener, a greenhouse is just a pipe dream. However, our desire to own one was so strong that when we learned of a wooden greenhouse which had to be removed from its location, we bought it, tore it down, hauled it to our own back yard and rebuilt it. Since then we feel that we were rather foolish to have done this when we could have had one of the small prefabricated aluminum greenhouses for only slightly more money and with much less work, and we would have ended up with a much more durable and attractive result. Nevertheless, our greenhouse has given us so much pleasure that we want to share our experience with others and urge them to investigate the small greenhouse for their own back yard.

An amateur carpenter can build a satisfactory greenhouse of moisture-resistant woods, such as redwood, using

either glass or rigid plastic for light. Prefabricated greenhouses come in such an infinite variety of styles, sizes and shapes that it is fascinating just to investigate them. Some can even be fastened to a house and used as an extra room. The most satisfactory greenhouse is one that best suits the needs of the individual owner and the types of plants he wishes to grow.

We must admit that in the type of greenhouse we have the upkeep is of major concern. The constant painting necessary on a wooden greenhouse causes us to hope some day for an all-aluminum one. Also, size is very important. Our greenhouse, which measures 9 by 11 feet, is proving to be too small. Almost everyone with a small greenhouse faces this problem sooner or later. Be sure to consider a greenhouse a little too large for your needs at first rather than having the expense

of adding on later. Of course, it is easy enough to add onto the greenhouse if you plan for this in the beginning; however we didn't.

In our climate, heating is the next most important concern, followed by the problem of ventilation. Just any heater will not do (we found this out the hard way). A gas heater must be vented to the outside as gas fumes will kill plants. Any greenhouse company has heaters and it is worth every penny to buy the best you can get. Since sunshine coming through glass rapidly builds up heat, the temperature inside a greenhouse has to be watched carefully. There are automatic controls available to open and close the vents on the greenhouse roof. As yet we have not been able to install these. Therefore, we must control these vents manually. Once you know what the combination of outside temperature and sunshine will do, it is fairly easy to determine when you must open and close these vents.

The cost of the greenhouse will depend a great deal upon its size and the type of equipment you choose. However, compared with other hobbies, we think the cost is quite reasonable. A



good greenhouse can cost considerably less than a new car and compares favorably with such hobbies as skiing, golfing, hunting or fishing. You can load your greenhouse with the most exotic and expensive plants or you can fill it at modest cost with a few dollars worth of seeds.

Our greenhouse is a free-standing one with a substantial base of cement blocks. We chose a location where it gets the sun all winter long with protection from the north winter wind. We kept it fairly low and even dug out the sod so we are a little below the ground, since we don't plan to grow tall things. In a greenhouse it is important to have a dirt floor even though you will want to pave your walkway. We made our benches of redwood set upon concrete blocks. We find ourselves rearranging these about every year in an effort to provide more room and better light conditions. This is our fourth winter with our greenhouse and during this time we have tried a great variety of plant material. We have come to the conclusion that greenhouse growing is not as simple as we thought. For instance, our collection of orchids just didn't thrive in the same room with carnations, geraniums and various other plants. We will either have to build a special section for our orchids where



we can keep them warmer and more humid, or do without all but the most hardy. We used to visualize armfuls of cut flowers from the greenhouse all winter long. This dream did not materialize. Because of the short winter days many plants will not flower. Even the bed of carnations is quite stingy at times.

We have invested in a variety of gardening and greenhouse books and have discovered the secret of getting our poinsettia to flower at Christmas; how to propagate various houseplants; what the light and heat requirements are for the plants we wish to grow. Every bit of new plant material calls for attention and study and we love it.

The main use for our greenhouse is to winter-over plants for our garden. We take up various bedding and planter box plants every fall and move them

into the greenhouse. At first we took cuttings to root and form new plants, but with all the activities connected with our school-age children we found our time limited. Now we simply pot up the old plants and clip the tops back severely. It doesn't really matter to us when they don't bloom well again until almost time to plant them out in the spring.

Two things we would not want to be without are our carnations (which we replace every fall with fresh new plants from a commercial grower) and a few tomato plants which we place directly in the dirt under the benches. We hoped to have tomatoes all winter, but find ourselves forgetting to get the seeds planted in time in the late summer. Our ripe tomatoes actually don't materialize until late spring or early summer, but they are delicious any time we have them.

One problem we have had with our greenhouse is watering. I feel this is a problem everyone has—even with plants in the house. For awhile we did not have water piped into our greenhouse and we were carrying it out in buckets—warmed so it would not chill the plants. This took a great deal of work for it often required as many as four buckets a day. Perhaps it was a labor of love, but it did get tiresome! This past summer we bought plastic pipe, the kind used in outdoor sprinkling systems, and dug a trench 18 inches deep between the house and the greenhouse. Then we tied into both the hot and cold water lines inside the house, put in valves so that we could mix any temperature we wanted, and ran the plastic pipe into the greenhouse. Inside we installed an elaborate system of pipes and tiny plastic sprinkling nozzles. We turn this sprinkling system on early in the morning when we want to



water and the watering is done in just a few minutes. This appears to be settling our watering problems and we also feel that the plants are doing much better now.

The greatest pleasure of all from our greenhouse is growing our own plants from seeds. We prefer annuals for our outdoor flower beds and we have favorites which we like to grow ourselves. Since we are active in the rose testing program of the Men's Garden Clubs of America, we have a long, narrow bed of many varieties of roses. It takes a good many flats of annuals to edge this bed, and after several summers we have found the Spungold Marigold and the Blue Mink Ageratum the most satisfactory. We also try to grow as many of the new varieties of annuals as we can accommodate. We start these seeds in small pans of milled sphagnum moss set over the greenhouse heater and have had the good fortune of developing

many flats of healthy and sturdy plants each spring. To help harden off these tender plants, we built a cold frame on the east side of our greenhouse. We find this indispensable. Not only does it toughen up the plants so they thrive when we set them into the ground, but it also serves to give us extra space at the critical time when our greenhouse is much, much too small to hold all these tiny plants every spring.

During the summer our greenhouse is almost empty except for a few plants which do not seem to mind the heat. We are trying to train a Concord grapevine over the top for shade, and perhaps eventually we shall be able to use it for plants even in the summer. Who knows, maybe we shall even install a refrigeration unit some day. There is just no end to the things one can do with a greenhouse. We urge all of you who love to garden to try a greenhouse of your own some day soon!



TURF:

The Quick Solution To A Good Lawn

IVAN LEECH

IT HAS BEEN SAID that next to automobiles more persons discuss the subject of lawns than any other. Be that as it may, one can hardly dispute the importance of a fine lawn to the home landscape.

Today's turf nurseries are producing varieties of lawn grasses that are particularly suited to special environmental and cultural situations. This means that the lawn can actually be designed

to suit the habits and tastes of the individual family.

Of all the grasses grown in Denver, Kentucky bluegrass is still the favorite. Its long growing season, ability to adapt to a variety of conditions and fine quality make it the perennial favorite. Merion bluegrass, a variety of Kentucky bluegrass, should also be considered by the individual desiring a truly high-quality lawn. The big

drawback of Merion bluegrass is that it requires more maintenance than Kentucky bluegrass.

Let us now compare a few of the advantages of sodding over seeding. We can all appreciate the struggles which the homeowner goes through in establishing a lawn from seed. The establishment of a good lawn from seed usually requires from two to three years. This, of course, depends upon management and weather conditions. Sodding can be done in a matter of hours and under average conditions the turf will be rooted down within a month.

Generally, a lawn can be seeded only in the spring or fall, whereas, sodding can be done whenever the soil is not frozen. This typically means from March until December. There have been cases, in the Denver area, where sodding has been carried out a few days before Christmas.

One of the greatest advantages of sodding is that it eliminates the dust and dirt involved in the seeding process. In addition, sodding immediately adds the beauty of a completed lawn to your landscape.

Soil preparation, prior to sodding, presents fewer problems than preparing for seed. This is true because sod is made up of mature plants which are able to establish themselves under conditions somewhat less than ideal. When preparing the lawn for sodding, the soil should be finish graded and 20 to 40 pounds of a balanced fertilizer, 10-8-4 for example, incorporated into each thousand square feet. This heavy application of fertilizer encourages the turf to root down into the underlying soil. Unless organic matter is already present in high percentage, well-rotted manure, peat or compost should be applied at the rate of 2 or 3 cubic yards per 1,000

square feet and worked deeply into the soil.

The home owner has the choice of hiring a landscape contractor to do the laying of the sod or, if he so desires, of doing it himself. If he decides to do the work himself he may find it to his advantage to lay only a small portion of the lawn at any one time.

Planting the sod is probably the simplest of all the operations in making a new lawn. Start laying the sod by butting the ends and sides up evenly. Overlapping of the sod will create an uneven lawn. Immediately after the sod is laid, go over it with a light roller. Follow this with a good watering, making certain the sod is wet clear through. Watch the new sod closely and when it starts to dry out give it another soaking. Watering once a week after the sod has knitted to the soil will usually be sufficient.

The success or failure of a lawn will depend, for the most part, on the amount of effort the owner expends on its maintenance. The amount of care given will depend upon the use to be made of the area and the appearance desired.

Generally speaking, newly established lawns should be mowed as soon as there is anything to mow. Mow often and regularly, clipping Kentucky bluegrass to a 2 inch height and Merion bluegrass to 1½ inches. Lawns should be fertilized as needed during the growing season. Additional applications should be made at six week intervals throughout the growing season.

If care is exercised in the selection of sod and proper maintenance techniques are followed, the home owner will be rewarded with a fine lawn which will add immeasurably to his home landscape.



In winter these flat rocks serve as a bird feeding station. A small pine, yucca, sagebrush and creeping juniper are part of the planting.

GARDENING IN THE MOUNTAINS

HERBERT E. SCHWAN

SEVERAL YEARS AGO we moved to Indian Hills. Here, 25 miles west of Denver and 2000 feet higher, we have adapted our gardening methods to those that will succeed in the pine zone.

Summer drought ordinarily prevails in this area, often for extended periods. Water from wells is limited and the community water is expensive. Insect infestations, especially grasshoppers,

can be destructive and difficult to control. Extreme winter temperatures generally are comparable to those of Denver, but dry winds and brilliant sunlight quickly damage or kill unadapted or newly established plants, especially shrubs. On the favorable side, average precipitation is greater than in Denver, the ground remains frozen and snow stays on north and east slopes throughout the winter.

The frost-free period is only 2½ to 3 months but many native flowers flourish in the invigorating coolness of summer. Mid-April sees our hills abloom with pasque flowers. The first cycle ends in July with sego lilies and Indian paintbrush. Two months later the fall cycle brings on asters and other late flowers.

We have avoided a large lawn because of the amount of water and care it demands. As a substitute, we have utilized generous amounts of stone in retaining walls, terraces, rock gardens and rock fields on slopes and under trees. Areas denuded during construction which are quickly invaded by weeds and parking and service areas were also covered with rock.

Large rocks shelter plants in winter, accumulate snow and remain warmer than the frozen soil. In summer the soil is cooler under rocks and moisture is conserved. Rocks also hold back competition from the crowding native sod and can be arranged to control runoff water. The ground under large pines is usually bare due to the interception of rain and snow by the trees. Here rock fields will allow the planting of a few drought resistant and shade tolerant plants.

All this suggests that special attention be given native plants. But we have also experimented with introduced species, at the expense of some water and additional care.

The native shrubs we like best are the common (Rocky Mountain) juniper, yucca and big sagebrush, along with kinnikinnic (bearberry) and creeping mahonia for ground cover and walls. Shrubby (bush) cinquefoil, boulder raspberry, ninebark and serviceberry can be transplanted if young. Mountain-mahogany and Fendler ceanothus are easy to propagate from collected seed. These and other native

shrubs are listed by nurseries and some may be grown from hardwood cuttings treated with rooting hormones. Chokecherry, snowberry and wild roses should be kept away from the garden. They are aggressive and very difficult to control.

Many introduced ornamental shrubs are subject to winter and drought damage and defoliation by 'hoppers. However, we have a very successful terrace planting, now four years old, on the east side of the house, sheltered from wind and sun and protected by snow, which includes Oregon grape, spreading yew, rock and cranberry cotoneaster, Corliss euonymus and the "fern leaf" euonymus — probably a variety of *E. nanus*. The junipers — pfitzer, creeping Andorra and tamarix are at home without protection. The shrubs that delight us most are two heath plants (*Erica carnea* var.) which are covered with rosy bells in April, often while snow is still on the ground. Other shrubs, such as lilacs and honeysuckles, are grown in the area in exposed situations.

Practically all of the native perennial herbs, with a few exceptions, such as the Indian paintbrushes, can be transplanted to desired locations. Some taprooted species, such as purple loco, should be dug so the root is preserved or they may be grown from collected seed. Natives should be transplanted with regard to site — from a shady spot to a shady spot or from moist area to moist area. Among those easy to transplant are the asters, fleabanes, columbine, eriogonum, sego lilies, alliums and many more. Monarda and the late-blooming, bright blue *Penstemon alpinus* help bridge the gap in the flowering season.

Several other western plants, not native to our area, supply bright color during the off-season. The poppy mal-

low (*Callirhoe involucrata*) comes from the Great Plains. Its decumbent stems spread widely and are covered with wine-red flowers from late July until hard frosts. The firechalice (*Zauschneria californica* and *Z. garretti*) also blooms late with a profusion of orange-red trumpets which attract humming birds. Its native home is the Great Basin. *Penstemon pinifolius*, with red flowers on 10-inch stems above heath-like leaves, is a late bloomer. It has been reported from Mexico. Sensitive briar (*Schrankia nuttalli*), usually offered as *Morongia uncinata*, from eastern Colorado, blooms here in July. Its bipinnate leaves, sensitive to touch and fluffy balls of pink flowers give the impression of a small mimosa. All of these are hardy, prefer sunny slopes and are offered in catalogs.

Most of the introduced hardy perennials are at home here but, with few exceptions, require extra water and care. The pinks, hardy candytuft and rock soapwort (*Saponaria ocymoides*) flourish with no more care than the natives. The rock plants revel in the cool climate and the tufted pansies put on a season-long show. Maiden pink

self-sows and the thousands of seedlings are a problem. We have a very showy planting of Siberian iris, lythrum, monkshood, *Helenium* variety Copper Spray and the salmon and red monarda on one corner of the leaching field where the roots find sub-surface moisture.

All of the hardy bulbs thrive in this climate. Tulips and narcissus do well among rocks under pines where shade is moderate and where there is usually enough moisture in spring for growth and blooming. The species tulips (*Tulipa turkestanica*, *T. eichleri*, *T. linifolia* and *T. fosteriana*) have done well and appear completely in place in the rock garden.

Then, for something unusual, perhaps in the wild landscape rather than the rock garden, native grasses are worth some experimenting. We have used *Festuca arizonica* and *Andropogon scoparius* in strategic places and intend to try others.

Our experience indicates that successful gardening in the mountains requires empathy for the site and delight in all the things that grow.

Heigh Ho! Plan for the Plant Sale in May!



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Plant PATENTS

and PATENTED Plants

A. C. HILDRETH

Our Patent System

OUR BASIC AUTHORITY for patents is written in the constitution. Article 1, section 8, empowers Congress "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."

Congress, in 1790, enacted the first patent law. Since then, it has been possible to patent all manner of inanimate things including, in the words of the Patent Office, "practically everything which is made by man and the processes for making them."

A patent is a grant to an inventor of "the right to exclude others from making, using and selling" his invention for a period of 17 years. This period in which the patent holder can exploit his invention without competition is a reward for his creative effort and an incentive for further discoveries.

Plant Patents

Patents on living things were first authorized by Congress in 1930, when it passed the Townsend-Purnell Plant Patent Act, as an amendment to the general patent law. The Plant Patent Act was amended by Congress in 1954. These two Congressional Acts constitute our plant patent laws.

A plant is a living thing which obviously cannot be "made." Therefore,

the wording of the ordinary industrial patent, which grants the right to exclude others from "making, using and selling" could not be used for plant patents. Instead, a plant patent grants "the right to exclude others from asexually reproducing the plant or selling or using the plant so reproduced."

It is interesting to note that, so far as the Patent Office is concerned, the holder of a plant patent is an "inventor" and the plant itself is an "invention."

When the original Plant Patent Bill was being debated in Congress it was emphasized that the purpose of plant patents was to afford agriculture, so far as practical, the same opportunity to participate in the patent system that industry had long enjoyed. Plant patents now provide incentive for achievement in gardening and horticulture and thus contribute toward placing agriculture on a basis of economic equality with industry. Thus far, however, it has not been found practical to include all kinds of cultivated plants under the plant patent system.

Some people may be surprised to learn that gardening and horticulture, including floriculture and nursery production, are considered by the Federal Government as agricultural activities. They are so considered not only by the Patent Office but also by the Internal Revenue Service and the Department of Agriculture. By extension, we may

assume that the Federal Government regards all gardeners, florists and nurserymen as "farmers."

Gardeners and Patented Plants

To most gardeners, a patented plant means only a more expensive plant. A plant patent holder usually prices a patented plant higher than an unpatented one. Also, if other plant propagators contract with the patentee to propagate and sell his patented plants, a substantial royalty usually is involved, which of course adds to the price of the plants. A price advantage to the patentee is in keeping with the intent of the patent law and is regarded as ultimately of benefit to the public.

Some gardeners believe that a patented plant is a plant of superior merit. Although many patented plants have been outstanding, this is not necessarily so. The Patent Office does not function as a kind of super All-America Award Committee. A Government patent has never been an official endorsement of a product.

What can be Patented?

The law now provides that "Whoever invents or discovers and asexually reproduces any distinct and new variety of plant, including cultivated sports, mutants and hybrids and newly found seedlings, other than a tuber propagated plant or a plant found in an uncultivated state, may obtain a patent therefore . . ."

It will be noted that patents are granted only on those plants which are asexually propagated. This means, of course, plants that are increased by budding, grafting, dividing, layering, rooting cuttings, etc. Plants propagated by seeds, such as ordinary field crops, annual flowers and annual vegetables, are not patentable.

The exclusion of tuber propagated plants applies specifically to the Irish

potato and the Jerusalem artichoke. Both are reproduced by tubers, which are also the parts that are used for food, for which purposes these crops are ordinarily grown.

Obtaining a Plant Patent

Anyone desiring to apply for a plant patent may obtain the necessary information from the Patent Office, Washington 25, D. C. Briefly the application for a plant patent includes:

(1) A written document petitioning the Commission of Patents for a plant patent, with full description of the plant and specifications or claims, showing ways in which it differs from all others of its kind; and the usual oath required of patent applicants, containing also a statement that the plant was asexually reproduced and, in case of a newly found plant, that it was found in a cultivated area.

(2) A drawing of the plant, showing its distinctive characters. If color is an important distinguishing feature, a colored drawing or a color photograph must be included.

(3) A filing fee of \$30.00.

The application papers and the drawings must be filed in duplicate. The second copy is for the Agricultural Research Service of the Department of Agriculture, which agency makes an advisory report on the plant under consideration.

Incidentally, if one changes his mind about getting a plant patent and cancels his application, the filing fee is not returned.

On second thought, it would be simpler and probably more satisfactory all around to employ a Patent Attorney and let him deal with the Patent Office. A roster of attorneys authorized to practice before the Patent Office has been prepared. Its title is "Patent At-

torneys and Agents Available to Represent Inventors Before the U. S. Patent Office." It is available for examination in the public library or may be bought from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for 35 cents.

Infringements

Infringement of a plant patent consists in an unauthorized person's asexually propagating, using or selling a patented plant. In such case the patent holder may bring suit in Federal Court. He may ask an injunction to stop the infringement and may also ask for damages.

These are matters to be settled by the court, the infringing person and the patentee. The Patent Office takes no part in seeking out cases of infringe-

ment nor in bringing legal charges against the offender.

Infringement of plant patents is probably more common than infringement of ordinary patents. This is because many people forget which of their plants are patented and because certain plants are very easily propagated asexually. In fact, certain perennials asexually reproduce themselves so readily that to grow them is to reproduce them. One can imagine some interesting legal questions arising about patent infringement when patented varieties of strawberries, oriental poppies and fall asters are being grown.

Despite such dire possibilities, plant patents, during more than three decades of operation, have functioned more smoothly than many American horticulturists predicted.

Heigh Ho! Plan for the Plant Sale in May!

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*Petunia Double Multiflora
Park's White Riches*

Photo Courtesy George W. Park Seed Co.

PETUNIAS

MIKE ULASKI

TO MY KNOWLEDGE, there has been little said or written about petunias, even though they are among the most popular of the outdoor bedding plants. Because of their versatility you will probably see them wherever flowers are planted.

The common usage of the word petunia can be traced back to about the year 1825. However, the varieties commonly used today were, for the most part, introduced within the past

few years. Of late, plant hybridizers have given them so much attention that we may now enjoy a broad range of different colors, shapes and sizes.

Petunias thrive in both ordinary and rich soils and will bloom well when planted in soils too rich for other plants. Some of the varieties used for bedding even do well under conditions of poor soil and high moisture. They are sun-loving plants, but bloom fairly well in partial shade. However, if grown under

shady conditions they do have a tendency to grow too rank.

Petunia culture is relatively simple and easy. The seeds may be sown directly in the field or in containers indoors. Direct sowing in the field is not advisable due to the small size of the seed which is estimated at about 280,000 seeds per ounce. For early and safe results it is suggested that the seed be planted indoors. It takes about 2½ months for petunia plants to reach a size sufficient to allow for outdoor planting. This means that in the Denver area it will usually be at least May 20th before outside planting can be undertaken. If planted out any earlier than this the young seedlings may require some protection. This can be accomplished by covering them lightly with newspaper. When planted with bare roots they should be covered for a few days, during the hours of brightest sunlight. This precaution will insure that the plants do not wilt excessively before the roots can get a good start. The seedlings may be uncovered during the night or on cloudy days.

There are several ways of starting petunia seeds indoors. (See "Starting Seeds Indoors," Helen Marsh Zeiner, March, 1963, *The Green Thumb*.) The seed can be planted in any container that allows for bottom drainage and that is at least 2 inches deep. A light-textured soil mixture should be used. Such a mixture can be formulated by mixing one part soil to one part peat and one part sand or vermiculite. If desired, the seed may be planted in a fine grade of pure vermiculite. The container should be filled to within one inch of the top with this soil mixture or vermiculite. The material is then tamped down and the seed is sparsely scattered on top. It is not necessary to cover the seed as watering will wash the



*All Double Multiflora Petunia
Park's RED RICHES*

Photo courtesy George W. Park Seed Co.

seed into the soil mixture or vermiculite, whichever is used. After the seed is planted and watered, the containers should be kept at temperatures of 60 degrees F. Cover the seed containers with newspaper until germination occurs. After germination, remove the paper and give the seedlings light. Following germination the seedlings should be fed a solution of ¼ teaspoon of Hyponex, or some other approved liquid fertilizer, dissolved in one quart of water. After three or four days it is a good practice to move the seedlings into an area with cooler temperatures. Temperatures of approximately 50 degrees F. seem to be ideal and make for a finer, more compact plant which will not get too spindly.

In the winter it is easy to produce blooms under glass. The quickest results are obtained from cuttings taken from selected out-of-doors plants. These cuttings, which will give true-to-the-

parent varieties, should be taken in September. Plants propagated in this manner should be grown at 50 degrees F. under adequate light. A word of caution, do not over-water, only water when the soil is getting dry. Watering may be required once a day or several times a day depending upon the existing conditions. Also, if the petunias are to be planted out-of-doors, be careful not to plant them where they will have *wet feet*, such as in areas of poor drainage or where the water will drain down a slope to them. It is better to keep petunias on the dry side rather than risk the chance of producing plants with yellow leaves — a common symptom of petunias grown in wet soil.

There are several classes of petunias from which to choose. For example, the large double flowering grandiflora, the large single grandiflora, or the single multiflora with small, 2-inch flowers. A recent introduction is the carnation-flowered or double multiflora petunia which is about the same size as the multiflora but the flowers are double. Another of the newer series of petunias is the cascade grandifloras, which are useful in urns, baskets and planters. Their habit is to cascade in-

stead of growing erect and their flowers range up to 5 inches across.

There are, in fact, so many varieties of petunias that it is impossible to mention them all. In the past three years the Denver Botanic Gardens alone have tested more than 175 varieties. Consequently, the following lists are not complete but do present what I consider to be some of the nicer of the varieties which will be grown in the Denver City Parks this coming summer.

Included in the grandifloras will be: Maytime, salmon-pink; Pink Magic, deep pink; White Magic, white; Seafoam, white.

The multifloras will include: Brass Band, cream-yellow; Comanche, brilliant scarlet-red; Mercury, light blue; Paleface, white; Pink Velvet, rose-pink.

In the all-double multifloras or carnation-flowered group we will have: Red Riches, red; White Riches, white; Cherry Tart, brilliant rose with pink and white flowers; Honey Bunch, soft, clear salmon.

There are so many good varieties of petunias available that one should have little difficulty in selecting a color and style to fit his own individual needs.

PETUNIA
MULTIFLORA
RICHES BLEND

Photo
Courtesy
George W.
Park Seed Co.





WINDBREAKS

IN EASTERN COLORADO

ARTHUR E. FERBER

ONE OF THE OUTSTANDING assets that make Denver and its surrounding cities and communities so attractive and beautiful is the abundance of various trees and shrubs. Without them our fair city would look bare and forlorn.

Many of our rural cousins in eastern Colorado have taken or are taking steps to improve their surroundings. Numerous farmers and ranchers are planting farmstead windbreaks in ever-increasing numbers to protect their homes, yards, livestock and wildlife from cold

wintry winds and drifting snow. They are planting narrow strips of trees to protect their crops and land from damaging winds and to hold snow on the fields.

With a nice tree windbreak as a background, many farm people are planting more lawns, flowers and ornamental trees and shrubs. With its contribution of form and color, as well as comfort, the windbreak can make a farm a home instead of a farmhouse — a home instead of just a place to live.

The climate in eastern Colorado is



not favorable to lush tree growth. Dryland farms are the rule and windbreaks in most cases must live on the current year's precipitation. Many species have been planted and tested during the past decades but only a relatively few are able to endure the cold winters and in some cases, the hot, dry summers. The

U. S. Horticultural Field Station, Cheyenne, Wyoming, the ARS Akron, Colorado Station, the Extension Service, the Fish and Game Department and, more recently, the Soil Conservation Service, have tested dozens of species of trees and shrubs in this area.

For dryland conditions the best spe-





cies are ponderosa pine, Rocky Mountain juniper, eastern red cedar, Siberian (Chinese) elm, honey locust, Russian olive, lilac and squawbush (*Rhus trilobata*). Several other fruit and berry producing species such as honeysuckle, western chokecherry and wild plum do fairly well on deep, loamy soils. The evergreen conifers are the best for sandy and clay soils and will live longer than the deciduous species in most locations. Besides, they furnish year-round protection.

Tree windbreak barriers in eastern Colorado should usually be located to the north and west of the farm home and yard area since most winter winds and storms come from that direction. Windbreaks may be from one to seven rows in width, depending upon the land available and the wishes of the owner. Tree rows should be spaced wide enough apart to permit timely cultivation for the life span of the plantation.

This will usually range from 18' to 24' between rows. Tree and shrub spacing in the row, however, should be closer together to form an effective wind and snow barrier.

One of the principal problems associated with the establishment of conifers has been poor survival. This problem has now been solved. The Colorado State Nursery, Ft. Collins, is growing the principal conifers in small asphalt pots. Landowners can purchase them at a reasonable price and they are assured of 85% to 100% survival even under dryland conditions. The availability of these plants has provided a boost in improving the quality and quantity of windbreak plantings. One row of good evergreens is worth three or four rows of defoliated hardwood species in the winter time. They also live longer and are more pleasing esthetically.

To supplement mechanical cultiva-

tion for weed control there now are available several chemical pre-emergence sprays which, when applied, help control weeds in the row in newly planted windbreaks. In previous years these weeds were usually controlled by hand hoeing. It has also been found that these weeds in the row can be controlled mechanically through the use of a tine-like tool that is hooked onto the tractor tool bar and run over the individual rows. The steel finger-like tines comb the soil surface and destroy the tiny weeds but do not harm the tree seedlings.

Mechanical tree planters are also now available which replace the back-breaking job of planting the seedlings with a shovel. So, along with rapid mechanical strides in other phases of agriculture and forestry, the establishment and care of windbreaks has also advanced with the machine age.

The cost of establishing a typical farmstead windbreak varies from approximately \$60 to \$100 per acre, depending upon the proportion of potted conifers used. But many farmers and ranchers have stated that their mature windbreaks are worth from \$2,000 to \$5,000. Trees and shrubs are valued highly in these windbreaks and they have proven to be one of the best investments a plains farmer or rancher can make.

Trees and shrubs have uses in many places in rural areas. They have a place in odd areas for wildlife habitat, for streambank and gully erosion control, for recreational purposes and just to dress up the bleak landscape for esthetic values. It is difficult to evaluate their worth in dollars and cents but they are used extensively in the conservation of our land and wildlife and materially increase the comforts and well-being of rural people.



Geraniums

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Geraniums are easy to raise from seed and you can have them in bloom most of the year — indoors and out. Plants flower 5 to 6 months after seeds germinate.

Here are some foolproof directions developed by W. Atlee Burpee Co:

1. Fill a shallow box, pot or seedpan within an inch of the top with finely sifted soil. Add a half-inch layer of fine vermiculite and firm it smooth.

2. Mark rows $\frac{1}{4}$ inch deep and 2 inches apart.

3. Gently rub the husks from the seed in the palm of your hand, or soak the seed in warm water a couple of hours to speed germination.

4. Sow the seed thinly and pat in,



Photo courtesy W. Atlee Burpee Co.
Geranium grown from seed, Floradale strain.

just barely covering. Keep the vermiculite evenly moist and moderately warm for 6 to 8 weeks since some seedlings require that long to appear.

5. When one or more true sets of leaves develop, carefully move seedlings to individual 2-inch pots. Later, when they become potbound, move to 4-inch pots, where they can remain for 3 or 4 months.

Geraniums flower best when slightly potbound and kept on the dry side. Use low-nitrogen fertilizer for more bloom, less foliage.

Heigh Ho!

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The Propagation Of

African Violets

JOHN S. CORYELL

AFRICAN VIOLETS are number one house plants today for two reasons: their almost infinite variations in color, size, and shape of leaf and flowers and the ease with which the parent plant may be reproduced from leaf cuttings. I intend to explain the growing of plants from African violet leaves.

African violet leaves will root and produce plantlets in water, sand, vermiculite, perlite, sphagnum moss, peat, or soil. The rooting medium may be any of these alone, or almost any combination of the above materials, plus others.

Basically, African violet leaves will root if you furnish them with water, oxygen, sunlight, normal temperature, and support. First, let's use water: Fill a glass tumbler, vase or bottle with water, cover with waxed paper held in place with a rubber band. Take a pencil, punch a hole in the waxed paper and insert the petiole (stem) of an African violet leaf so that the stem end is covered with water. Set in a warm, light window to await root development. Watch the water level and do not allow it to drop below the stem end

(or ends). Roots should appear in a few days to a few weeks, depending upon the age, condition, and type of leaf. When the roots are about $\frac{1}{2}$ inch long, transplant the leaf to a pot full of moist vermiculite or sand.

Many African violet growers claim only green, brown, or dark bottles should be used. Actually, anything that will hold water is suitable, and you must decide which you prefer by trying several. (Then other African violet growers go into rapture over their methods, which may be simple, or very, very complicated.)

I personally prefer vermiculite or perlite, and mixtures of these. Fill a 2", 2 $\frac{1}{4}$ ", or 2 $\frac{1}{2}$ " pot with vermiculite and moisten. The size of pot depends upon your preference only, and your wish to keep varieties separate. Actually, a baking dish, whether round, square, or oblong, is very fine for rooting African violet leaves, especially if you wish to root several leaves at one time. Even plastic silverware "pans" or plastic bread boxes are excellent. Imagination knows no bounds.

After the pan or pots are filled, wet them thoroughly. If the pots have

drainage you cannot over-water. Pans with no drainage must be kept moist, but never have water more than barely showing on the bottom. Too much water drives out oxygen, and can kill roots in a very few days.

What type of leaves? How do you prepare them? The outside, fully developed leaves are usually too old and slow in rooting, with a death rate of 50% to 100%. The very center leaves are usually too small and tender. They *CAN* be used, but it is not recommended. The leaves between the center and the outside are excellent.

With the thumb and forefinger take hold of the petiole near the main stem. Move your hand sideways, with a slight pull, and the leaf and stem will come free. Then break off all except the two inches next to the leaf blade and the leaf is ready to put into the rooting medium. With a pencil punch a hole in the moist vermiculite, rotating the pencil to make a hole for the stem. Insert the stem and **GENTLY** push the vermiculite down around it to firm the stem in place. Place a label next to the leaf for support, with the variety name on it. Use one leaf per 2" pot, to several leaves in a 3" or larger pot. Space the stems far enough apart to give the leaf blades room for air circulation.

Humidity plays a big role in the rooting of African violet leaves. Individual pots or pans may be placed in plastic bags until rooted. When removing them from plastic bags, do it gradually. Remove for an hour or two, then two to four hours, then all night, then all day and night.

Light is necessary for all plants, and also for rooting leaves. Leaves for rooting do not need as much light as blooming plants, but they do need some light. Generally the more light the better the

rooting and growth of new plants. One 40-watt fluorescent light hung 12 inches above a bench or table will light an area large enough to grow about 500 young plants from leaves, at one time. The problem is what to do with the 500 young plants!

Cleanliness is necessary to success in growing plantlets from African violet leaves. New pots and new vermiculite must be used, unless you sterilize everything before use. Organisms causing root-rot and damping-off are present all the time. Common sources of infection are tools or pots which previously contained infected leaves. Plastic pots and glasswares may be sterilized by soaking in a solution of Chlorox (1 cup to a gallon of water). Soak at least half an hour, and do not re-use solution too often, as the chlorine is used up.

Clay pots and vermiculite or sand may be boiled for 30 minutes, and are ready to use when cool. Formaldehyde is an excellent disinfectant but difficult to use anywhere except out-of-doors.

There are many ways to transplant plantlets. The following are the ones which I prefer: 1. Dig the rooted leaf and plantlets out of the pan with a spoon, or dump the pot gently. Pull off each plantlet large enough to handle and replant in a pan of vermiculite, 2"x2". Water carefully with a weak fertilizer solution (such as ¼ teaspoon Plant Marvel to 1 gallon of water) for three weeks, then transplant to pots and regular African violet soil. 2. Mix one part African violet soil to one part vermiculite, and transplant plantlets as soon as they are large enough to pull away from the mother leaf. Keep the freshly potted plants covered with a plastic cloth or out of drafts for a few days after transplanting. Water very carefully, and do not allow the plants to become too dry, nor to be kept too wet.



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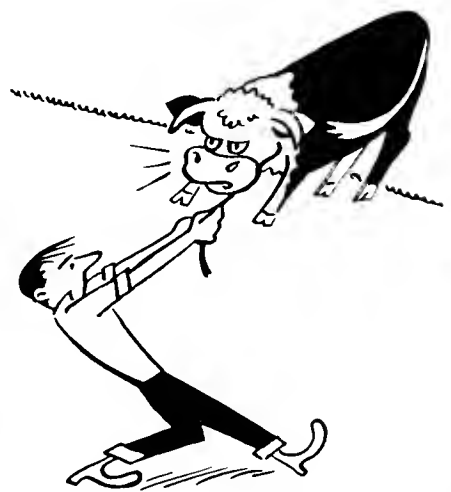
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Victor Tawara

Heigh Ho! Plan for the Plant Sale in May!

Flower TIPS



Photo courtesy All-America Rose Selections

Royal Highness, 1963 All-America Rose award winner.

SOCIETY OF AMERICAN FLORISTS
WASHINGTON, D.C.

HERE ARE some tips for the proper care of cut flowers:

1. As soon as you arrive home with cut flowers, place their stem ends in deep warm water. Pour warm water into the container in which they will be arranged. Cut the stem ends diagonally with a sharp knife. Remove all foliage below the water level in the arrangement. Add a commercial flower preservative to the water.

2. Some cut flowers, such as eu-

phorbias, have a milky substance or juice which should be sealed into the stem by quickly dipping the stem ends 1-2 inches into boiling water. The upper leaves and flowers should be protected from the steam with thicknesses of paper.

3. If stem ends get soft or decayed, recut the stems to remove that portion. Should any flowers look wilted, recut their stems and place them in very warm water.

4. Keep flower arrangements away from draughts, direct sunshine, and hot radiators. Resting them in a cool, dark place at night will refresh them and prolong their beauty.

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A PROGRESS REPORT

HELEN MARSH ZEINER

READERS WHO have an interest in the Kathryn Kalmbach Herbarium will be pleased to know that the herbarium has recently acquired 3 new metal herbarium cases, bringing to 4 the number of metal cases in the herbarium. These cases are housed in the small herbarium room which opens off *The Green Thumb* office. They have made it possible to move a part of the general collection of Colorado plants from unsightly and unsafe wooden cases to permanent, good-looking and insect-proof cases. In time, we hope to have the entire collection in such cases.

The Herbarium Committee at present is working on the Mt. Goliath col-

lection, mounting and preparing plants which were collected by Dr. E. H. Brunquist. This collection should be of value to anyone interested in alpine flora.

The next project of the committee is to begin a collection of cultivated plants which should be useful in identification for any gardener. If anyone would be interested in contributing plants for this collection, call the Herbarium Committee Chairman, Dr. Helen Zeiner, at 722-3655.

Botanic gardens has also recently acquired a stereoscopic microscope which will be very helpful in identifying plants for the herbarium collections.



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Things To Do In

APRIL

JOSEPH W. OPPE

APRIL HAS long been famous for its breathtaking display of blossoms on the early flowering shrubs, trees and bulbs. Remembrance of these flowering extravagances, in years past, should not lull one into a false feeling of security. Keep in mind the fact that, above all, April weather is unpredictable. Any plans for outside activities should be formulated with this in mind.

Of all the gardening activities for which April is suitable, tree and shrub planting is perhaps foremost. J. Sterling Morton, founder of The Morton Ar-

boretum, Lisle, Illinois, must have recognized this when he brought about the establishment of the first Arbor Day on April 10, 1872. Arbor Day is on the third Friday in April in Colorado. This year it will be celebrated on the 19th.

When planting trees and shrubs it is necessary to follow certain fundamental rules. Most important of these is to select plants which have proven themselves hardy for our area. Any reputable local nursery or garden shop, many of which advertise in *The Green*



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Thumb, will help you in selecting the right tree or shrub. Before purchasing nursery stock make certain that it is in good condition. Nursery plants that have dry roots or shriveled bark or balled and burlapped stock on which the ball of earth is soft or broken are not worth planting.

After selecting the proper tree or shrub, here are a few pointers to follow:

1. Make certain that the planting hole is large enough so that the roots are not crowded.

2. Check the drainage in the planting hole by filling it with water. If it takes several hours for the water to drain then the planting site should be changed or corrective measures taken.

3. No matter what type of soil is involved, its structure will be improved through the addition of organic matter such as peat moss or leaf mold. A good ratio is two parts soil to one part organic matter.

4. Following planting, watering should be thorough and regular. Dig around the base of the plant to check for moisture. If the soil in this area is dry, water is necessary. Supplemental watering is required for most all plants cultivated in our area and is extremely important during the time it takes the plant to become established.

Roses may also be planted at this time. The same basic technique described above may be used. Following planting they should be cut back severely to about 8 inches and the soil should be mounded up so that only the tops of the stems show. This soil should remain until new growth begins.

Perennials such as phlox, shasta daisies, painted daisies, chrysanthemums, fall asters and monarda may be planted or moved. Most perennials are moved with a ball of soil around the roots. They should be placed in adequate sized holes and carefully watered.

Hardy annuals such as larkspurs and asters can be seeded out-of-doors. Generally speaking, any of the annuals which naturally reproduce themselves from seed in this climate are hardy enough to plant out at this time. April weather is changeable and the less hardy annuals should not be planted out until the middle or latter part of May.

If not already done, dormant sprays may now be applied. Inspect your deciduous shrubs, particularly the cotoneasters and lilacs, for scale infestations. Junipers should be checked for aphids and elm and maple trees for scale. A little extra caution shown at this time may save you trouble in the months to come.

Most of the deciduous and evergreen species of trees may be pruned now if pruning has not already been done. The pruning of spring flowering shrubs should be postponed until after the blooming period to insure a maximum of flowers.

Those of you who are interested in obtaining plants for your home gardens should keep in mind the annual plant sale to be held on May 11th and 12th at the Denver Botanic Gardens, 909 York Street. Proceeds from this sale will go to the Botanic Gardens and its Children's Garden Program.

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The Green Thumb

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1963



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MAY
Vol. 20
No. 4



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• • • • •

THE COVER

SARAMOHR, one of the many fine Mohr hybrids developed by Dr. Loomis, is seen blooming in his Colorado Springs garden.

•••••

CALENDAR of EVENTS

Every Saturday Morning — 9:15 a.m., KLZ Radio
The Green Thumb Program, Herbert Gundell, Denver County Agricultural Agent

Every Saturday Afternoon — 3:30 p.m., KLZ-TV, Channel 7
The Weekend Gardener, Herbert Gundell

AT BOTANIC GARDENS HOUSE MAY

- 13 — Monday, 10:00 a.m., Judges Council
- 14 { — Tuesday, Flower Show School
- 15 { — Wednesday, Flower Show School
- 16 { — Thursday, Flower Show School (a.m. only) 10:00 a.m., Around The Seasons Club
- 20 — Monday, 4:00 p.m., Denver Botanic Gardens Board of Trustees.
- 21 — Tuesday, 1:00 p.m., Rocky Mountain African Violet Council
- 22 — Wednesday, 11:00 a.m., Sunbonnet Garden Club Luncheon Meeting

- 24 — Friday, 1:00 p.m., Ikebana International Flower Arranging Class

MAY

- 28 — Tuesday, 7:30 p.m., Colorado Cactophiles

JUNE

- 3 — Monday, 10:00 a.m., State Federation of Garden Clubs Board Meeting
- 4 — Tuesday, 12:00 - 4:00 p.m., Mountain View Garden Club Flower Show
- 5 — Wednesday, 7:30 p.m., Botany Club
- 6 — Thursday, 7:45 p.m., Orchid Society
- 9 — Sunday, 1:00 - 4:00 p.m., Colorado Portrait Artists Assoc. Display of work



Notes and Notices

PICK UP ONE of the new brochures now available at Botanic Gardens House. This will be very helpful to anyone who wishes to have more information about the purposes and services of Denver Botanic Gardens.

THE LANDSCAPE DESIGN SCHOOL will again take place at Denver Botanic Gardens House, 909 York Street on Tuesday, Wednesday and Thursday, June 11, 12 and 13. Call Mrs. W. R. Glenn, HA 4-1190.

SUMMER SEMINARS on mountain ecology and alpine tundra ecology will be held at Hidden Valley Lodge, Rocky Mountain National Park, Estes Park, Colorado.

The session on mountain ecology will be held July 1-6 and the sessions on alpine tundra ecology June 24-29 and July 8-13.

These seminars are sponsored by: Rocky Mountain National Park, Institute of Arctic and Alpine Research, Rocky Mountain Nature Association, Estes Park Chamber of Commerce, Colorado State Department of Education.

For further information on these seminars contact, Executive Secretary, RMNA, P.O. Box 147, Estes Park, Colorado.

The American Iris Society Meets In Denver

EVERETT LONG

ORGANIZED IN 1920, the American Iris Society each year has an Annual Meeting at blooming time. Convention sites shift from one area to another but only once before, in 1954, has the society met in the Rocky Mountain re-

gion, when Salt Lake City was headquarters.

In 1956 Region 20 of the AIS extended an invitation to meet in Colorado and subsequent action of the society directors designated Denver for the 1963 meeting. Next year the Chicago area will be host and 1965 will find Irisarians assembling in Memphis.

In its 43 years the Society has grown to an active, robust organization of over six thousand persons. Membership is open to all, with individual memberships available at five dollars annually; family membership only six dollars. Memberships accepted with alacrity by Regional Vice-President, Everett C. Long, Box 19, Boulder, Colorado; or National Executive Secretary, Clifford W. Benson, 237 Tower Grove Bldg., St. Louis 10, Missouri.

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IRIS

At Denver Botanic Gardens

EVERETT LONG

AFTER BUILDING UP for several years, iris activity will reach a peak this year at Denver Botanic Gardens with the American Iris Society Official Guest Garden serving as the highlight. This unique planting is described in another article in this issue, but here we want to say this is THE year for *The Green Thumb* readers to visit the iris plots. Next year we anticipate a beautiful showing, too, but by that time, the nearly 700 guest plants will be back home with their originators. Even a non-iris lover, should there be such an odd creature, might find an innate, subliminal spark touched off by this year's kaleidoscopic array.

Gathered together at Denver Botanic Gardens are many species and forms of iris representing many parts of the iris spectrum. These include:

DWARF IRIS

We mention these dainty, diminutive, desirable darlings first, for their blooming time is late April and early May. If *The Green Thumb* falls open to this page as the postman hands it to you, don't hesitate, don't procrastinate but hie yourself quickly to Denver Botanic Gardens, for some of these cuties will already be out of bloom.

In the last dozen years dwarf iris have come into their own. Ardent advocates, such as Walter Welch, have

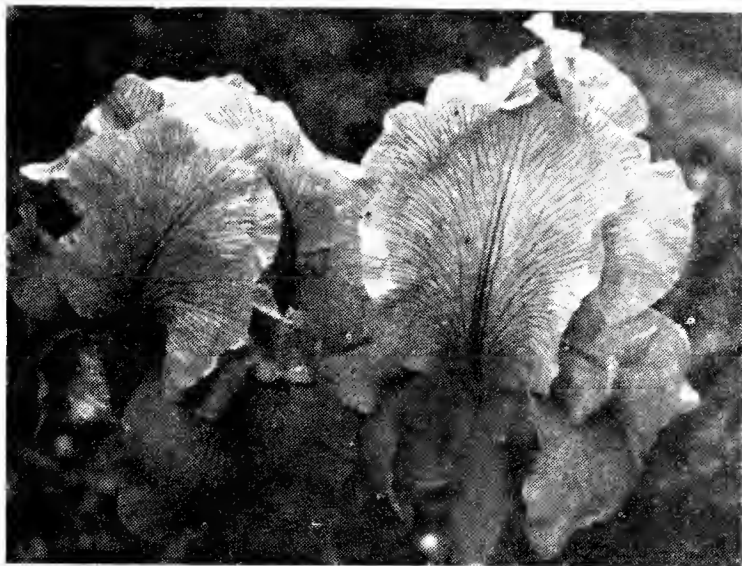
brought the class to everyone's attention with dedicated zeal and hybridizing break-throughs. The very limited color range of older dwarfs, from tones of purple and yellow to nearly white, was first expanded by Paul Cook, working with two species, *Iris arenaria* and *I. pumila*. Denver Botanic Gardens has an especially fine collection of *I. pumila*, with 54 plants of these little fellows in one bed. Their characteristic growth rarely exceeds six inches. Over 70 dwarf plants in other beds include the Caparne (top dwarf accolade) award-winning Veri-Gay by Mr. Welch; and Little Mohee, West Wind and Sawtooth Range by our neighboring Nebraskans, the Grapes sisters, of Big Springs.

MEDIAN IRIS

Median designation is that given bearded irises ranging in height from about 10 to 28 inches. In this group there is a wide range of colors, flower shapes, stalk characteristics and plant habits. In this class, as in many others, there has been a tremendous amount of breeding work carried on in recent years with results gratifying to the hybridizers. Geddes Douglas crossed *Iris pumila* with tall bearded varieties and came up with charming flowers ranging from 6 to 18 inches in height. His coined name, Lilliput, has since been

used to cover all iris in this class from this ancestry.

Denver Botanic Gardens' medians range from the 50 year old Zua, a mutation of Florentina characterized by grey-white color and extremely crinkled crepe-paper-like substance, through Douglas lilliputs such as Tinkerbelle, to the perky, flaring Blue Denim of Bee Warburton. It is hoped to add more



I. GATESII
Famous Oncocyclus species

care be given for growing them in this country. But, if some of the spectacular species such as *Iris gatesii*, *I. lortetii* or *I. sari* bloom successfully this spring I'm sure all viewers will find their great globular flowers with striking markings and characteristic signal patches worth some effort to produce. The Aril Society International has been of great help in supplying material for the plantings.

In addition to the straight aril iris, there are a number of arilbred-arils crossed with other types such as the regular tall bearded. Denver Botanic Gardens has an unusually fine collec-



I. SUSIANA
An Oncocyclus species

plants this summer to this group which now numbers just over 50.

ARIL AND ARILBRED IRIS

Aril iris are so named because the seeds they produce have a distinct white collar or aril, on one end. Arils can be roughly divided into two main categories: oncocyclus and regelia. Typical oncocyclus species, come from Jordan, Lebanon and Syria while regelias are of more northerly origin, being indigenous to Turkestan and the western slopes of the Himalayas. Climatic differences require that extra



BLUE JOY
Typical Regelia type

tion in this category which we shall refer to as:

WILLIAM MOHR DERIVATIVES

In 1923 the California hybridizer, William Mohr, bloomed a cross of tall bearded Parisiana by *Iris gatesii* which retained many of the desirable oncocyclis traits. Plants were small but the flowers were extremely large, globular in shape and exquisitely veined. Before Mr. Mohr could put this iris on the market he met an untimely end in an automobile accident. His friend and associate, Sidney B. Mitchell, introduced the hybrid in 1925 under the name William Mohr. Mr. Mitchell, alas, is no longer with us but this writer will digress long enough to repeat his trenchant observation on the therapeutic value of iris breeding, made in a speech to the American Iris Society Annual Meeting in Portland, Oregon, in 1949: "No iris hybridizer with unbloomed seedlings has ever been known to commit suicide."

William Mohr has no pollen and is difficult to set seed. But over the years many very fine varieties have come either directly from it or through Capitola, which is a cross of William Mohr by Ib-Mac. Since Ib-Mac is one half oncocyclis, Capitola progeny receive the same proportion of oncocyclis traits as those coming directly from William Mohr.

There are some 128 Mohr derivatives in Denver Botanic Gardens. Not all are named; several are seedlings from Dr. Loomis, whose Elmohr won the coveted Dykes Medal. You will have to make several trips to catch all the bloom in this bed. Some, such as Conquest, Suiter Mohr and Persian Pattern bloom quite early; others come along later. Some, such as Mary McClellan and Anytime, show few oncocyclis characteristics except great size;

others like Witch Doctor are of exotic appearance.

SIBERIAN IRIS

Siberian iris have not received as much attention from hybridizers in recent years as other kinds. The collection at Denver Botanic Gardens numbers slightly over two dozen and includes many of the best known and best liked varieties, such as Caesar's Brother, Gatineau, Lady Astor, Snow Crest and Zest.

SPURIA IRIS

Blooming later than tall bearded iris and ahead of the Japanese, spurias' gain in popularity results from noteworthy hybridizing achievements. Two deceased Californians, Eric Nies and Carl Milliken, made great strides in spuria development. Marion Walker, also from California, but very much alive, has brought forth some very fine introductions and to him we are in-



WAYWARD WIND

Recent Award of Merit winner
Originated by O. T. Baker

debted for many of the 38 spuria varieties. Thanks also to Ben Hager, yet another Californian, for his help.

JAPANESE IRIS

Few people in the Rocky Mountain region have tried growing Japanese iris since their cultural preference for neutral or acid soil is at odds with the generally alkaline soils of the area. A dozen varieties at Denver Botanic Gardens should be blooming from very late June well into July.

TALL BEARDED IRIS

Complementing the Official Guest Garden planting are two show gardens of up-to-date, highly-rated tall bearded iris. Here are over 300 recently introduced varieties, including Dykes Medal winners and Award of Merit selections galore. Perhaps it is well to have this background of modern iris to aid in careful evaluation of the new plants seen in the Official Guest Garden. Certainly it is an essential aid in the critical appraisal of the almost 100 seedlings to be found in the:

REGIONAL TEST GARDEN

Area hybridizers have entered seedlings they feel have a potential for recognition beyond the confines of their own garden. Test Garden plants are identified only by code number to insure as unbiased an evaluation as possible. In like manner impartial judging is carried out in the:

NATIONAL TEST GARDEN

Denver Botanic Gardens has one of the five National Test Gardens, each located in varying climatic zones, where evaluation of new varieties on a nationwide basis can be ascertained.

RANDOLPH COLLECTION

Having followed along the iris trail enjoying the beauty hybridizers have given us in the many different types, let's gain perspective by looking back to the antecedents of today's creations. The Randolph Collection of species, mentioned in another article in this issue, gives us a glimpse of some of this ancestry. We know how wonderful iris are now. What will tomorrow bring?

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AIS Convention

Guest Garden

J. O. RILEY

IN RECENT YEARS, plantings of guest iris in convention gardens have become an increasingly attractive feature of the American Iris Society Annual Meetings. Thanks to facilities provided by Denver Botanic Gardens, this year for the first time all guest plants will be together in one large plot where, under uniform conditions, hybridizers' accomplishments can be compared, evaluated and enjoyed.

For *The Green Thumb* readers who may be somewhat bewildered over "guest iris," let us explain that an invitation was sent to all AIS members in 1961 to submit to the Official Guest Garden, iris they wished to have displayed this year at the Denver meeting. Last year Chicago gardens were planted with guest iris in preparation for the meeting there next year, and this summer, guest iris will be sent to Memphis for display at the 1965 convention.

The iris planted in the official gardens remain the property of the grower or hybridizer and after the annual meeting is finished, there remains the big task of returning to each and every owner, his or her iris. This job of returning the guest irises, which were planted as a single rhizome, is a large one, as each plant may now have several of these underground stems.

Statistics do not always make for interesting reading, but these items may be of interest. In the Official Guest Garden we have 692 separate and distinct irises, which were sent to us by 179 hybridizers, who live in 32 differ-

ent states and 3 foreign countries. It is also interesting to note that of the total number of iris, only 416 varieties are named; the other 276 varieties are being shown under seedling number. This is occasioned by the fact that many hybridizers feel it desirable to place their seedlings in the Official Guest Gardens so that they may be seen by a large membership of the society. While the exact figures are not available, it might be added that a large number of the named varieties listed above were sent to us under seedling number.

In addition to the Official Guest Garden located in Denver Botanic Gardens, we have supplemental displays of guest iris at the Long Iris Gardens in Boulder; the Dr. James H. Brown and Dr. P. A. Loomis Gardens in Colorado Springs. Hybridizers were requested to send as many as three rhizomes of their iris and whenever this was done, the additional rhizomes were placed in the above gardens.

The detail of the planting at Denver Botanic Gardens is as follows:

BED NO. 1

Next to Iron Picket Fence
South Row — from East to West

SDLG. 913C6	O. & T. Brown, Wash.
SDLG. H 57-41	Hoage, Wash.
BAYADERE	O. & T. Brown, Wash.
SDLG. 9-9A18	Brown, Wash.
RASPBERRY WHIRL	Brown, Wash.
SDLG. H-57-13-12	Hoage, Wash.
SDLG. H-56-7-1	Hoage, Wash.
SDLG. GB-7-8	Benson-Rogers, Texas
ORANGE PARADE	Hamblen, Utah
SDLG. GB-18-2	Benson-Rogers, Texas
SDLG. GB-9-8	Benson-Rogers, Texas
J. H. FOTHERGILL	Fothergill, Eng.
HIGHLAND CASCADE	Fothergill, Eng.
ARCADY	Fothergill, Eng.

W. RILEY	Fothergill, Eng.
PALACE GARDENS	Fothergill, Eng.
DOROTHY KING	Fletcher, Eng.
GILSTON GRANGE	Fletcher, Eng.
GILSTON GOBLIN	Fletcher, Eng.
GILSTON GRAIL	Fletcher, Eng.
GILSTON GIRL	Fletcher, Eng.
GILSTON GUITAR	Fletcher, Eng.
GILSTON GULF	Fletcher, Eng.
BIANCA NEVE	Fletcher, Eng.
SDLG. 57-68A	Fletcher, Eng.
SDLG. 55-128A	Fletcher, Eng.
BLUE ASTERISK	Greenlee, Ill.
SDLG. D57-7	Durrance, Colo.
MY MARY	Kelway & Son, Eng.
CANARY BIRD	Kelway & Son, Eng.
KNIGHT VALIANT	Kelway & Son, Eng.
FOREST HILLS	Kelway & Son, Eng.
MAGIC HILLS	Kelway & Son, Eng.
PRAIRIE RAMBLER	Kelway & Son, Eng.
ELIZABETH ARDEN	Kelway & Son, Eng.
BLUE SOVEREIGN	Kelway & Son, Eng.
GLORY OF JUNE	Kelway & Son, Eng.
DAME JUDY	Kelway & Son, Eng.

North Row — from East to West

SDLG. 15-59	McKusick, Ariz.
SDLG. 66-59	McKusick, Ariz.
SDLG. 94-59	McKusick, Ariz.
SDLG. 29-61	McKusick, Ariz.
SDLG. 1-60	McKusick, Ariz.
PICORA PINK	Pickard, Ill.
SDLG. 55-25	Pickard, Ill.
PINK PASSION	Pickard, Ill.
SDLG. 57-30-2	Pickard, Ill.
TAN MOHR	Luke, Idaho
DARDANIAN	Wills, Tenn.
SILVERGILT	Wills, Tenn.
KING'S MOUNTAIN	Wills, Tenn.
GLACIER GOLD	Wills, Tenn.
ALEMBIC	Wills, Tenn.
BRIGHT HERALD	Wills, Tenn.
STARCHY SUE	Wright, Ohio
BLUE MESA	Benson, Texas
SDLG. 1-72-3	Babson, Calif.
SDLG. J-75-2	Babson, Calif.
FAIR IMAGE	Babson, Calif.
GOODNESS	Babson, Calif.
RATTAN	Babson, Calif.
SUMMER HILLS	Babson, Calif.
GRAND RULER	Dubes-Young, Nebr.
SDLG. 56-26-1	Dubes-Young, Nebr.
BLUE REJOICE	Dubes-Young, Nebr.
SDLG. 58-56-1	Dubes-Young, Nebr.
SDLG. 58-31-1	Dubes-Young, Nebr.
SDLG. 57-15-1	Dubes-Young, Nebr.
SDLG. V-30-1	Vache, Texas
SDLG. 61-47-E	Knopf, Calif.
SDLG. 61-40-E	Knopf, Calif.
SDLG. 13-A-74	Knopf, Calif.

Short Row on North

ROYAL ANTHEM	Hinkle, Ill.
MAGIC MORN	Hinkle, Ill.
SDLG. 13-A-99	Knopf, Calif.

BED NO. 2

South Row — from East to West

PINK ICE	Rudolph, Ill.
SEPTEMBER SONG	Hamblen, Utah

MOLLIE EMMS	Hamblen, Utah
SDLG. H 8-72 A	Hamblen, Utah
BEVERLY JEAN	Hamblen, Utah
SDLG. H 7-105 A	Hamblen, Utah
SDLG. DM-5-61	D. Mick, Kan.
SDLG. DM-13-61	D. Mick, Kan.
SDLG. M-47-60	W. H. Mick, Kan.
SDLG. M-42-60	W. H. Mick, Kan.
SDLG. M-12-61	W. H. Mick, Kan.
SDLG. M-3-61	W. H. Mick, Kan.
CUMBERLAND ROSE	Kerr, Tenn.
COFFEE ROYAL	Merrill, Calif.
SDLG. S-60-2	A. M. Smith, Ill.
SDLG. S-61-2	A. M. Smith, Ill.
LATEST LOVE	Gaulter, Calif.
SDLG. 59-95	Gaulter, Calif.
SDLG. 60-34	Gaulter, Calif.
SDLG. 60-40	Gaulter, Calif.
SDLG. 60-69	Gaulter, Calif.
SDLG. 60-75	Gaulter, Calif.
SUNLIT LACE	Tallant, Okla.
EAST OF EDEN	Cochran, Okla.
NUT SPICE	Hockett, Nebr.
PARTY APRON	Hockett, Nebr.
DEVILS TONGUE	Hockett, Nebr.
BURMA RUBY	Hockett, Nebr.
STAR POINT BLUE	Hockett, Nebr.
SDLG. H 58-1-6	Hockett, Nebr.
BOLD RULER	Leland, Iowa
GREAT WONDER	Leland, Iowa
TURBO FIRE	Leland, Iowa
SDLG. L 58-5	Leland, Iowa
SDLG. L 59-20	Leland, Iowa
SDLG. L 69-9	Leland, Iowa

North Row — from East to West

LADY RUFFLES	H. W. Schirmer, Mo.
SDLG. E-4	H. W. Schirmer, Mo.
BREATHLESS	C. O. Schirmer, Mo.
RARE GOLD	C. O. Schirmer, Mo.
GAY APPAREL	C. O. Schirmer, Mo.
SUNLIT BAY	C. O. Schirmer, Mo.
SDLG. K-22	C. O. Schirmer, Mo.
SDLG. N-22	C. O. Schirmer, Mo.
SDLG. 4760 B	Palmer, Mo.
SDLG. 7360 A	Palmer, Mo.
SDLG. 5760 A	Palmer, Mo.
SDLG. 1659 A	Palmer, Mo.
SDLG. 5161 B	Palmer, Mo.
SDLG. 9660 B	Palmer, Mo.
BOTANY GOLD	Johnson, N. J.
ABOMINABLE SNOWMAN	Johnson, N. J.
TELLURIDE	Johnson, N. J.
TIMBUCTOO	Johnson, N. J.
AUTUMN LUSTER	Johnson, N. J.
SDLG. 61-33 A	Olson, Mo.
SDLG. 61-16 B	Olson, Mo.
SDLG. 61-34 A	Olson, Mo.
SDLG. 61-15 A	Olson, Mo.
SDLG. 61-34 B	Olson, Mo.
GAY GEISHA	Olson, Mo.
PELLA	Morgan, N. Y.
SDLG. 58-9-A	Carlson, Wash.
ANN LOUISE	Carlson, Wash.
YUKON MAGIC	Carlson, Wash.
IVORY PALACES	Carlson, Wash.
PINK 'N PRETTY	Sexton, Calif.
HAPPY DEB	Sexton, Calif.
RUTH'S LOVE	Sexton, Calif.
BY REQUEST	Sexton, Calif.
JESSIE VIETTE	Randolph, N. Y.
NEW FRONTIER	Sexton, Calif.

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BED NO. 3

South Row — from East to West

BECAUSE	Wolff, Nebr.
SDLG. 2-56A	Moulding, Utah
SDLG. 7-56	Moulding, Utah
SDLG. X-6	Beeman, Calif.
SDLG. 8-6	Beeman, Calif.
SDLG. 36-8	Beeman, Calif.
ROSE HERMOSA	Sundt, N. M.
DISTANT MESA	Kirk, Calif.
BLACK CHARM	Hooker, Ill.
TOP HELEN	Tharp, Idaho
MISS ALAMEDA	Awalt, Calif.
EVER & EVER	Muhlestein, Utah
SPEAK SOFTLY	Muhlestein, Utah
DARK FURY	Luihn, Calif.
FORMAL AFFAIR	Moulding, Utah
SDLG. B 58-05	Barkdull, Utah
CHIPPER	Stephenson, Conn.
MOMAGUIN	Stephenson, Conn.
ANGEL'S DREAM	Eva Smith, Idaho
GRACIE PFOST	Eva Smith, Idaho
GOLDEN DELIGHT	Eva Smith, Idaho
JEANIE	Eva Smith, Idaho
IDAHO CREAM	Eva Smith, Idaho
SNOWY VISTA	Eva Smith, Idaho
TOGA. VIOLET	Savage, Mich.
DR. DICK	Savage, Mich.
GARDEN LAKE	Savage, Mich.
WABASSEE	Savage, Mich.
HEPATIC BLUE	Savage, Mich.
SEKEETA	Savage, Mich.
SDLG. 53 M-1	Jones, Ore.
SDLG. 430-1	Jones, Ore.
SDLG. 492-1	Jones, Ore.
SDLG. 490	Jones, Ore.
SDLG. 427	Jones, Ore.
GEE GEE	Guenther, Iowa

North Row — from East to West

SDLG. A-59-2	McGee, Ala.
TRISHA	McGee, Ala.
SEAFAIR QUEEN	R. Brown, Wash.
KING OF NEPAL	R. Brown, Wash.
ARIZONA SUNSET	R. Brown, Wash.
CANARY RUFFLES	R. Brown, Wash.
SDLG. 58-68-9	R. Brown, Wash.
SDLG. 58-59-11	R. Brown, Wash.
CAROLINA ROYAL	Powell, N. C.
LAKE ISABELLA	Muhlestein, Utah
SDLG. 116	Muhlestein, Utah
UTAH VELVET	Muhlestein, Utah
LOV-LEE	Rogers, Mo.
MONARCH PASS	Rogers, Mo.
MERRY MOOD	Rogers, Mo.
GOLDEN SWALLOW	Rogers, Mo.
MOJAVE DAWN	Rogers, Mo.
KAY-CEE	Rogers, Mo.
GRAND SURPRISE	Schortman, Calif.
GOLDEN DAWN	Schortman, Calif.
CREAM BALLET	Schortman, Calif.
GLITTERING SANDS	Schortman, Calif.
LOVE NEST	Schortman, Calif.
HAPPY HOLIDAY	Schortman, Calif.
CLOUD DANCER	Plough, Wash.
EDENITE	Plough, Wash.
RAINBOW GOLD	Plough, Wash.
LEATHER LACE	Plough, Wash.
CHERRY PINK	Plough, Wash.
SPANISH AFFAIR	Plough, Wash.
NORTH COUNTRY	Nelson, Idaho
NIKE	Nelson, Idaho
FLYAWAY	Nelson, Idaho
COUNTRY CLUB	Nelson, Idaho
FRENCH FLAIR	Nelson, Idaho
LATIN QUARTER	Nelson, Idaho

BED NO. 4

South Row — from East to West

SDLG. 5135	Hale, Ky.
SDLG. 5154	Hale, Ky.
SDLG. R-3-2	Hinkle, Ill.
SDLG. R-8-1	Hinkle, Ill.
BRAVE VIKING	Hinkle, Ill.

VILLAGE GREEN	Hinkle, Ill.
CRINOLINE BELLE	Vallette, Idaho
BLACK ROSE	Vallette, Idaho
CASCADE RIPPLES	Vallette, Idaho
PEARL QUEEN	Vallette, Idaho
ROSY MOHRN	Vallette, Idaho
ROYAL REGALIA	Vallette, Idaho
BIG DEAL	Bellagamba, Mo.
ARCTIC SYMPHONY	Randolph, N. Y.
EXOTIC BLUE	Randolph, N. Y.
GAY CHARTREUSE	Randolph, N. Y.
PINK CHEEKS	Randolph, N. Y.
SDLG. R 56 77-2	Randolph, N. Y.
SDLG. R 53 248-2	Randolph, N. Y.
SDLG. SLSS-A60	Meitzler, Ohio
SDLG. MR-GR-1	Meitzler, Ohio
SDLG. SLSS-159	Meitzler, Ohio
SDLG. L-59-X	Meitzler, Ohio
PEACE TOKEN	Meitzler, Ohio
JUNGLE ENCHANTRESS	Meitzler, Ohio
CARE MOHR	Christensen, Wash.
COLOR PARADE	Christensen, Wash.
EASTER BOUQUET	Christensen, Wash.
GRAND RONDE	Christensen, Wash.
MOHR PURPLE	Christensen, Wash.
SACAJAWEA	Christensen, Wash.
ATTENTION	Robinson, Tenn.
BLOSSOM FESTIVAL	Berndt, Mich.
SDLG. 57-6	Maxim, Calif.
SDLG. 57-10-C	Maxim, Calif.
QUICK STOP	Maxim, Calif.
MIDNIGHT WALTZ	Burbridge, Calif.

North Row — from East to West

DARK ECSTASY	Lyon, Calif.
PINK CASTLE	Lyon, Calif.
ENCHANTED EVENING	Lyon, Calif.
SDLG. D60-53	Durrance, Colo.
CARVED JADE	Lyon, Calif.
ROYAL RUBY	Goodman, Ill.
IVORY SATIN	Goodman, Ill.
BRIGHT SAILS	Goodman, Ill.
ISLE OF WIGHT	Goodman, Ill.
YELLOW JADE	Goodman, Ill.
WOODBORNE	Gilmer, Va.
SDLG. 263-A	Silfies, Pa.
MY FAIR LOVE	Silfies, Pa.
SDLG. 452-A	Silfies, Pa.
LAVENDER WINGS	Silfies, Pa.
VESUVIUS	Abell, Calif.
SAFFRON JEWEL	Abell, Calif.
SOFT SKY	Abell, Calif.
JADE	Abell, Calif.
SDLG. 56-6-4	Abell, Calif.
JUST PEACHY	Sheaff, Ill.
SDLG. 60-3	Sheaff, Ill.
PINK FLURRY	Sheaff, Ill.
LAVENDER FROST	Sheaff, Ill.
ANGELIQUE	Batson, Ala.
SDLG. 57-1-A	Fraser, Ala.
PARTY DOLL	Fraser, Ala.
SDLG. D-1	Scott, Mo.
SDLG. D-2	Scott, Mo.
SDLG. D-3	Scott, Mo.
SDLG. D-4	Scott, Mo.
SDLG. D-5	Scott, Mo.
JERSEY BEAUTY	Schortman, Calif.
BLAZING FIRE	McCord, Ind.
SDLG. 5821	McCord, Ind.
SDLG. 5838	McCord, Ind.

BED NO. 5

South Row — from East to West

SUN HAVEN	Reynolds, Tenn.
STEEL HAVEN	Reynolds, Tenn.
BELLE HAVEN	Reynolds, Tenn.
HERMOSA HAVEN	Reynolds, Tenn.
FLUTED HAVEN	Reynolds, Tenn.
BON BON HAVEN	Reynolds, Tenn.
BRASILIA	Schreiner, Ore.
FIRE MAGIC	Schreiner, Ore.
GYPSY JEWEL	Schreiner, Ore.
SDLG. R 905-A	Schreiner, Ore.
BLUE MOUNTAIN	Schreiner, Ore.
BRIGHTSIDE	Schreiner, Ore.
GOLDEN MINK	R. Brizendine, Kan.

SDLG. B-48-60	R. Brizendine, Kan.
SDLG. B-104-60	R. Brizendine, Kan.
SDLG. B-48-59	R. Brizendine, Kan.
SDLG. B-60-60	R. Brizendine, Kan.
SDLG. 54-17-1	Wolff, Nebr.
SDLG. 54-38-4	Wolff, Nebr.
DEBBIE ANN	Wolff, Nebr.
TIMMIE TOO	Wolff, Nebr.
CUTIE	Schreiner, Ore.
LITTLE SHEBA	Abell, Calif.
ARCTIC FLARE	A. Brown, Wash.
SDLG. M 202-17	A. Brown, Wash.
DAINTY DANCER	A. Brown, Wash.
ROYAL CONTRAST	A. Brown, Wash.
ANGEL'S LOVE	A. Brown, Wash.
SKY BABY	A. Brown, Wash.
BITOGOLD	Schortman, Calif.
LADY KAY	Muhlestein, Utah
LITTLE LYNN	Sheaff, Ill.
PAGODA	Jones, Ore.
GLACIER BAY	Jones, Ore.
FROSTED LIME	Barkdull, Utah
PENNY ARCADE	Jones, Ore.
SDLG. 2058	H. F. Smith, Ind.
INGENUE	Muhlestein, Utah

North Row — from East to West

SDLG. B-31-60	R. Brizendine, Kan.
SDLG. 57-50 YA	Y. Adams, Colo.
SDLG. 57-5 DJA	R. Adams, Colo.
SDLG. 57-42 B	R. Adams, Colo.
SDLG. 57-16 A	R. Adams, Colo.
SDLG. 56-14	R. Adams, Colo.
CAYENNE CAPERS	Gibson, Calif.
BLUE SPINEL	Gibson, Calif.
HENNA STITCHES	Gibson, Calif.
WILD GINGER	Gibson, Calif.
SDLG. 61-7LA	Gibson, Calif.
SDLG. 51-5E	Gibson, Calif.
SHADOW WALTZ	Tompkins, Ore.
SDLG. 59-44	Freudenberg, Nebr.
SDLG. 59-45	Freudenberg, Nebr.
SDLG. 60-13	Freudenberg, Nebr.
ALMIRA	Freudenberg, Nebr.
SDLG. L-7A5	T. Brown, Wash.
SOONER LAND	Venable, Okla.
LILLI-HOOG	Warburton, Mass.
SUGAR	Warburton, Mass.
BLUE DENIM	Warburton, Mass.
GOLDEN FAIR	Warburton, Mass.
DEAR LOVE	Warburton, Mass.
DELICATE AIR	Warburton, Mass.
ZING	M. Brizendine, Kan.
LITTLE REB	M. Brizendine, Kan.
SDLG. CH-55	Hansen, Utah
SDLG. 1-110	Tuller, Ore.
SDLG. 61-10	Maughan, Utah
DEAD SEA SCROLLS	Zurbrigg, Ind.
SCINTILLA	Fothergill, Eng.
SDLG. 12 C-56-1	Larsen, Utah
SDLG. 12 C-56-2	Larsen, Utah
CARNEY'S BLUE	Carney, Tenn.
LILLIPINKPUT	Douglas, Tenn.
WESTWARD	H. Grapes, Nebr.
SDLG. 58-18	H. Grapes, Nebr.

BED NO. 6

South Row — from East to West

MOM DARLING	Freudenberg, Nebr.
SDLG. D 59-59	Durrance, Colo.
SDLG. D 55-11	Durrance, Colo.
SDLG. D 58-30	Durrance, Colo.
SDLG. S 76-B	Salzer, Calif.
SDLG. 164B	Ackerman, Mich.
SDLG. 8-31B3	O. Brown, Wash.
BRIGHT CLOUD	O. Brown, Wash.
EMERALD FOUNTAIN	O. Brown, Wash.
WINTER OLYMPICS	O. Brown, Wash.
SDLG. 105	Tompkins, Ore.
SDLG. 60-1	Beach, Ill.
SDLG. 61-4	Beach, Ill.
SDLG. 60-01	Slensker, Colo.
CITY OF HAMBURG	Murawska, Ill.
YELLOW EMPRESS	Murawska, Ill.
LADY LOBELIA	Murawska, Ill.
PINK SPLENDOR	Murawska, Ill.

MT. RUSHMORE	Murawska, Ill.
FLIRT	Gatty, N. J.
FRIENDSHIP	Gatty, N. J.
SDLG. 60-6	Gatty, N. J.
SDLG. TE 31	Finney, Wash.
SDLG. 15B9	Goett, Conn.
YOUNG BRAVE	L. Peterson, Utah
MAIN EVENT	L. Peterson, Utah
TRICOLOR	Douglas, Tenn.
SDLG. 58-40-B	Peterson-Douglas, Tenn.
SDLG. 58-41-C	Peterson-Douglas, Tenn.
SWEET LILANI	Noyd, Wash.
PICTURE PRETTY	Noyd, Wash.
SDLG. N6-18	Noyd, Wash.
QUIET CHARM	Noyd, Wash.
ULTRAPOISE	Noyd, Wash.
LLITA	Tams, Utah
SDLG. T-8-59	Tams, Utah
SDLG. T-12-59	Tams, Utah

North Row — from East to West

MANNA MARIE	Hartman, Colo.
GLACIER FALLS	Hartman, Colo.
SDLG. S 53-0	Hartman, Colo.
EARLY AUTUMN	Varner, Ill.
SDLG. 58-105	Varner, Ill.
SDLG. P1-59	Paige, Colo.
SDLG. 59-48	Thaler, Ohio
SDLG. 60-90	Thaler, Ohio
SDLG. 60-69	Thaler, Ohio
STARBEAU	Thaler, Ohio
BESS ALBRIGHT	Thaler, Ohio
BOTANY GOLD	Johnson, N. J.
TWENTY ONE GUNS	Johnson, N. J.
FRONT RUNNER	Johnson, N. J.
SDLG. GB 15-1	Benson, Texas
BLUE MESA	Benson, Texas
SDLG. SPT 70-4	Benson, Texas
SDLG. BB 56-1	Benson, Texas
SDLG. 59-2	Benson, Texas
TEX-TAN	Benson, Texas
ALL ETERNITY	Jensen, Utah
BOUNDING MAIN	C. & K. Smith, N. Y.
SDLG. 58-2B	Tompkins, Ore.
DYNASTY	C. & K. Smith, N. Y.
PEARL MOSQUE	C. & K. Smith, N. Y.
IMPERIAL WOMAN	C. & K. Smith, N. Y.
SARAH AVERELL	C. & K. Smith, N. Y.
TEEN ANGEL	Nitchman, Ohio
SMILING MAESTRO	Nitchman, Ohio
SDLG. 60-26	Blodgett, Wis.
HONEY HUE	Schmelzer, Wash.
TERRY LEE	Schmelzer, Wash.
LIME JOY	Schmelzer, Wash.
HOPE DIVINE	Schmelzer, Wash.
LILAC SNOW	Schmelzer, Wash.
BELLE PRAIRIE	Schmelzer, Wash.

BED NO. 7

South Row — from East to West

PACIFIC HARMONY	Terrell, Calif.
SDLG. 55-5	Terrell, Calif.
SDLG. 57-44C	Terrell, Calif.
BLUE PARASOL	Bartholomew, Mass.
GLITTERING PEARLS	Bartholomew, Mass.
HANS C	Hansen, Utah
GAY HOLLIDAY	Tuller, Ore.
SDLG. 39-93	Tuller, Ore.
SDLG. M AM-1	Metcalfe, Mont.
SDLG. M 576-601	Metcalfe, Mont.
SDLG. M 2581	Metcalfe, Mont.
SDLG. M 1591	Metcalfe, Mont.
SDLG. M 3591	Metcalfe, Mont.
SDLG. M 8591	Metcalfe, Mont.
SDLG. AD-7	Koon, W. Va.
SDLG. 58-143	Tompkins, Ore.
BETTY ZANE	Koon, W. Va.
LIME GROVE	Fothergill, Eng.
JUNE TWILIGHT	Koon, W. Va.
HIGHLAND CASCADE	Fothergill, Eng.
ORANGE OPAL	James, Africa
WAKITA	Hooker, Ill.
CROSS COUNTRY	Knocke, N. J.
SDLG. K-9	Knocke, N. J.
WHITE TULIP	Knocke, N. J.
BLUE TULIP	Knocke, N. J.

MARY LOU Jacobson, Colo.
 SDLG. 59-81 Tompkins, Ore.
 GENTLE ANNE Feil, Colo.
 SDLG. 58-97 E. & A. Watkins, N. H.
 SDLG. 57-24A E. & A. Watkins, N. H.
 SDLG. 58-64 E. & A. Watkins, N. H.
 GLAD-LO-META G. Sanders, Okla.
 MARTHA ANGELINE G. Sanders, Okla.

North Row — from East to West

SDLG. 68-59 Eldorado Grdns., Kans.
 ARTIST'S MODEL Eldorado Grdns., Kans.
 DEAR DORA Eldorado Grdns., Kans.
 DESERT MAGIC Eldorado Grdns., Kans.
 FEATHER FAN Eldorado Grdns., Kans.
 SDLG. 61-60 C. & R. Rees, Calif.
 QUIVERING FLAME Zurbrigg, Ind.
 CARMEL SUNDAE Zurbrigg, Ind.
 PRINCESS ANNE Zurbrigg, Ind.
 ALGONQUINN PARK Zurbrigg, Ind.
 FERN FRASER Zurbrigg, Ind.
 DEBRA KATHLEEN Fail, Calif.
 TULE PRIDE Fail, Calif.
 TULE SUNSHINE Fail, Calif.
 MISSION SUNSET Bro. Charles, Ill.
 MOUNT HOPE Meszaros, Wis.
 CIRCUS BOY Theurer, Utah
 BERNADETTE Theurer, Utah
 ARCADY Fothergill, Eng.
 SDLG. 8-8 Russell, Ill.
 SDLG. 7-19 Russell, Ill.
 SDLG. 6-45 Russell, Ill.
 SDLG. 6-22 Russell, Ill.
 SDLG. 5-51 Russell, Ill.
 SDLG. 59-34 Varner, Ill.
 SDLG. 58-63 Varner, Ill.
 ILLINI GOLD Varner, Ill.
 PURPLE HEART Varner, Ill.
 HICKORY SMOKE Varner, Ill.
 SDLG. 61-13-2 Foster, Calif.
 SDLG. 61-21-1 Foster, Calif.
 SDLG. 61-21-3 Foster, Calif.
 SDLG. 61-25-8 Foster, Calif.

BED NO. 8

South Row — from East to West

FREEDOM FESTIVAL Riggs, Mich.
 MARY BETH Riggs, Mich.
 MARILYN SUE Riggs, Mich.
 SHERRY STASKA Riggs, Mich.
 SYLVIA RIGGS Riggs, Mich.
 BLUE BEAUTY Bailey, Ala.
 ALABAMA MOON Bailey, Ala.
 OLD ROSE Bailey, Ala.
 GREEN SHEEN Murphy, Mo.
 SDLG. 53-06 Howland, Mich.
 TERRY'S CHOICE Parker, Ky.
 SDLG. 59 JXW2 Parker, Ky.
 SILVERY COLORADO Duncan, Colo.
 GOLD WINGS Duncan, Colo.
 MYBETH Duncan, Colo.
 WHITE PRIDE Branch, Ill.
 BABY DREAMS Branch, Ill.
 BLUE FANTASY Branch, Ill.
 SLEEPING PRINCESS Branch, Ill.
 ROYAL FANFARE Branch, Ill.
 SDLG. 1-13-2 Benson, Texas
 SLAVA Ellyson, Iowa
 MOURNING DOVE Ellyson, Iowa
 SDLG. Z 58-28 Ellyson, Iowa
 SDLG. BB 58-18 Ellyson, Iowa
 SUN DOG Ellyson, Iowa
 SDLG. Z-61-01 Ellyson, Iowa
 SDLG. D 60-79 Durrance, Colo.
 SALLY PARKS Etheridge, Texas
 HAWAIIAN ORCHID Stall, Colo.
 COLORADO SUNSET Stall, Colo.
 SDLG. 58-2 Ross, Okla.

North Row — from East to West

SDLG. K-2 Knocke, N. J.
 ALABASTER Fuller, Texas
 TEXAS LADY Fuller, Texas
 SDLG. 58-C Fuller, Texas
 MOCHA CREAM Fuller, Texas

FANCY RUFFLES H. W. Schirmer, Mo.
 APRICOT PRINCESS C. & A. Gardens, Calif.
 SDLG. 56-300 C. & A. Gardens, Calif.
 LADY ANGIE C. & A. Gardens, Calif.
 CLARAMINO C. & A. Gardens, Calif.
 SDLG. 8G-54 Larsen, Utah
 SDLG. 9A-52 Larsen, Utah
 WAVE CAP Schliefert, Nebr.
 SDLG. 853-26 James, Africa
 SDLG. SFxJPx CAP James, Africa
 FLOUNCED MARVEL Austin, Calif.
 FLOUNCED LOVELINESS Austin, Calif.
 FLOUNCED PREMIERE Austin, Calif.
 FABULOUS FRINGES Austin, Calif.
 FLOUNCED SPOON Austin, Calif.
 ROSE SPOON Austin, Calif.
 SDLG. 1-55 Heisz, Kan.
 AROUND ABOUT Nebeker, Utah
 SDLG. 518 Nebeker, Utah
 SDLG. 527 Nebeker, Utah
 SDLG. B-21 J. H. Brown, Colo.
 SDLG. B-25 J. H. Brown, Colo.
 SDLG. 54-21-1 Carney, Tenn.
 SDLG. 56-31-1 Carney, Tenn.
 SDLG. 444-3 Weber, Colo.
 SDLG. S-59 Stafford, Colo.

BED NO. 9

South Row — from East to West

RED ROOSTER R. Rogers, Colo.
 SDLG. B-62 R. Rogers, Colo.
 SDLG. B-61 R. Rogers, Colo.
 LILAC DELIGHT James, Africa
 JUST HEAVEN James, Africa
 BORDER GEM James, Africa
 SALMON GLORY James, Africa
 LOURIES FLIGHT James, Africa
 SALMON GLORY James, Africa
 RED CAP James, Africa
 ICE FLOE James, Africa
 ROZANTHA James, Africa
 GREEN ARCHER James, Africa
 BOLD BARON James, Africa
 ROCKWOOD LUCK Luckey, Colo.
 SDLG. K-1 Knocke, N. J.
 SDLG. C-6-59 Cline, Colo.
 JEANETTE ALLEN Allen, Tenn.
 WHISPERING WIND H. Grapes, Nebr.
 PRAIRIE BELLE H. Grapes, Nebr.
 SDLG. 58-21 H. Grapes, Nebr.
 SONSEEHRAY H. Grapes, Nebr.
 SDLG. 410-12 James, Africa
 BIANCA NEVE Fletcher, Eng.
 GILSTON GUNMETAL Fletcher, Eng.
 SDLG. 58-98-2 A. Brown, Wash.
 SDLG. 57-104-3 A. Brown, Wash.

North Row — from East to West

SDLG. 58-20 A. Brown, Wash.
 SDLG. 59-59-1 A. Brown, Wash.
 SDLG. 55-357-20 A. Brown, Wash.
 SDLG. 186-4 A. Brown, Wash.
 SDLG. R 61-1 Roos, Colo.
 BART Minnick, Mo.
 SHASTA ANNIE Minnick, Mo.
 SDLG. 08 Savage, Mich.
 KARIN V. HUGO Martin, Germany
 KROENUNGS MANTEL Martin, Germany
 OMA'S SOMMERKLEID Martin, Germany
 SDLG. B M 5-52 Martin, Germany
 MARGARET GRATIN Martin, Germany
 BUTTONS & BOWS Suiter, Idaho
 TOMEKO Suiter, Idaho
 APRICOT LUSTRE Suiter, Idaho
 LANDSCAPE PINK Suiter, Idaho
 SDLG. 58-45 Luihn, Calif.
 SDLG. DU-3 Galyon, Tenn.
 SDLG. DU-4 Galyon, Tenn.
 SDLG. G-58-4 Gordon, Colo.
 SDLG. G-59-3 Gordon, Colo.
 SDLG. G-59-10 Gordon, Colo.
 SDLG. G-59-11 Gordon, Colo.
 SDLG. G-59-15 Gordon, Colo.
 SDLG. G-61-5 Gordon, Colo.

BED NO. 10

South Row — from East to West

PERCUSSION	Baker, Colo.
LONELY NIGHT	Baker, Colo.
SDLG. 58-28B	Baker, Colo.
MOUNTAIN BREEZE	Baker, Colo.
DUNGAREE DOLL	Baker, Colo.
DO TELL	Baker, Colo.
SDLG. C-1-57	Cline, Colo.
SDLG. C-21A-59	Cline, Colo.
SDLG. C-4-60	Cline, Colo.
SDLG. 59-84	Hoage, Wash.
SDLG. X-1	Cline, Colo.
SDLG. X-1	J. Brown, Colo.
SDLG. SB-59-7	J. Brown, Colo.
SDLG. D 60-90	Durrance, Colo.
SDLG. D 61-92	Durrance, Colo.
SDLG. D 7-133	Durrance, Colo.
SDLG. 123-57	Cook, Ind.
SON OF SATAN	Wickersham, Eng.
SIVA-SIVA	Gibson, Calif.
DREAM SPUN	Gibson, Calif.
SDLG. 9-34	Fothergill, Eng.
SDLG. 9-33	Fothergill, Eng.
SDLG. 8-14	Fothergill, Eng.

North Row — from East to West

SDLG. D 60-43	Durrance, Colo.
KALIFA BALTIS	White, Calif.
JALLAH AD DIN	White, Calif.
JABAL KERAK	White, Calif.
MOHRNING HAZE	Luihn, Calif.
ASOKA OF NEPAL	White, Calif.
PURPLE JOPPA	White, Calif.
COUQUETRY	White, Calif.
LABAN EFFENDI	White, Calif.
SDLG. D 61-75	Durrance, Colo.
KALIFA FATIMA	White, Calif.
BALI AGA	White, Calif.
KALIFA KASHAN	White, Calif.
CHEN:K AGA	White, Calif.
SOME LOVE	White, Calif.
RING SIDE	Baker, Colo.
SINGING WIND	Baker, Colo.
SDLG. D 58-33	Durrance, Colo.
ODDFELLOW	Muhlestein, Utah
SDLG. D 59-51	Durrance, Colo.
ELMOHR'S CHOICE	Durrance, Colo.
SDLG. D 59-44	Durrance, Colo.

BED NO. 11

One Row Only — from East to West

IMAM SALAH	White, Calif.
KALIFA HIRFA	White, Calif.
KALIFA GULNARE	White, Calif.
TATAI PASHA	White, Calif.
BLACK JOPPA	White, Calif.
IMAM AHMID	White, Calif.
KALIFA KABUL	White, Calif.
KALIFA BALTIS	White, Calif.
SDLG. 19B54	White, Calif.
SDLG. 53B54	White, Calif.
ONCO B	White, Calif.
BEISAN AGA	White, Calif.
GRAND VIZIER	Hawkinson, Calif.
AHMID AGA	White, Calif.

BED NO. 12

One Row Only — east of gate — next to picket fence — from West to East

WHITE WONDER	Kelway & Son, Eng.
BLUE FINCH	Kelway & Son, Eng.
SULTRY SKY	Neel, Eng.
SILVERTIDE	Neel, Eng.
SDLG. 60-61	MacKendrick, Colo.
SDLG. 61-A	MacKendrick, Colo.
RUFFLED VALENTINE	R. Brizendine, Kan.
MONTICELLO	Varner, Ill.
ENGAGEMENT	Savage, Mich.
ISLE ROYAL	Savage, Mich.
SPRING WILLOW	Savage, Mich.
SDLG. 57	Savage, Mich.
SDLG. 20B	Savage, Mich.
SDLG. 106-55	Cook, Ind.
SDLG. 300	Naas, Colo.

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Lucky Friends of Sara and Phil

EACH YEAR, during the latter part of May and the early part of June, hundreds of Colorado Springs residents and many from more distant areas, stop at 1332 N. Walnut and 1414 Culebra to fill their eyes with beauty and their hearts with the delight of multi-hued blossoms of thousands of superbly grown modern tall bearded irises. The credit for giving us this yearly enrichment, over the past half century, goes entirely to one of our little publicized, but justly famous octogenarians, Dr. P. A. Loomis. Those of us who have been fortunate enough to know Dr. Loomis and his gracious and charm-

ing wife, Sara, have had the additional rewards of sharing their hospitality and wisdom over and above the pure enjoyment of sharing the beauty of their lovely gardens.

Their home garden, at 1414 Culebra, is surrounded by a protecting forest of tall evergreens and deciduous trees. Much of it is laid out in formal beds interlaced with neatly kept walks of grass. Here, they grow hundreds of the latest iris introductions from the top hybridizers throughout the nation and even foreign countries. Here, too, are many of "Phil's" favorites from among the many thousands of his own

seedlings. Besides the formal beds, there are nooks and hidden sunny spots among the trees where less formal displays of seedlings and selected seedlings may be found. Near a back corner greenhouse are hot frames where last year's seeds are getting a start ahead of the spring warmth and rains.

A wide lot, which is one block deep, at Walnut Street contains thousands of Dr. Loomis' seedlings from his own hybridizing, blooming for the first time under his critical eyes. This year, the Walnut Street lot also contains the guest irises for the 1963 American Iris Society convention. These irises are the top favorites of many of America's hybridizers and hopefully, next year's commercial iris introductions. This year, convention goers by the hundreds will have the rare and happy experience of seeing many hundreds of "Phil's" seedlings. Since iris hybridizing is a hobby for his own pleasure, many of his very fine selections are never introduced to commerce and therefore do not become widely known. Inevitably, such an outstanding seedling comes along that his friends insist that it be introduced and then, quite often it becomes one of the favorites of iris enthusiasts throughout the world.

Because of his keen, critical eye for quality and his many outstanding accomplishments in iris breeding, he was awarded the Hybridizers Medal of the American Iris Society in 1944. His outstanding, large flowered iris, El-mohr, won for Dr. Loomis, in 1945, Irisdom's highest award, the Dykes Medal. El-mohr has been among the 100 favorites of the members of the American Iris Society continuously ever since. To this day, it still rates the fiftieth position. Other well known irises introduced from his garden include

Castle Rock, Blue Throat, Aspenglow and the lovely white, Award of Merit winner, Spanish Peaks.

Mrs. Pattison, a justly famous lady in iris history, introduced Blue Velvet in 1929, the first of Dr. Loomis' own seedlings to be made commercially available to the public.

Pink irises are quite common now but it wasn't always so. One of the first, and perhaps the very first, was Seashell which Dr. Loomis found among his early seedlings. Exhibited at the 1933-34 World's Fair and later introduced in 1940, it created quite a stir and not a little bit of controversy. Dr. Loomis recalls that one of the horticultural experts at the fair said there wasn't any such thing as a pink iris and essentially accused him of using a dye material in the soil to create the color. Several "Doubting Thomases" sent him telegrams in the same vein. Time has long since vindicated Dr. Loomis, and a majority of today's pink irises have Seashell in their remote ancestry.

Many of "Phil's" irises are sought after as parents in other hybridizers' programs. A not yet introduced pink, still called by its number, SQ 72, was widely used in pink breeding programs and is in the parentage of such famous pinks as Pink Formal, Pink Enchantment and June Meredith, all top award winners. Blue Throat and Spanish Peaks have been extensively used in breeding many of the world's prize winning blue and white irises.

Anyone who appreciates a fine flower and especially a fine iris, owes much to Dr. Loomis, Colorado's great and famous pioneer in iris breeding. Those of us who have been close enough to Dr. and Mrs. Loomis to have spent happy hours with them, have learned to love them and are honored by having received their greatest gift of all — their friendship.

IRIS MISSOURIENSIS:

the "Wild" Iris of Colorado

LYS HOUSLEY

EXCEPT FOR hybrids and mutations, every flower that grows was once a "wild" flower. None of the "wild" ancestors of our popular, tall bearded garden iris were native to any part of the Americas. Nor, with one exception, are any irises to be found growing in the native state below the southern border of the United States. But, ranging in many localities northward from the bayou country of Louisiana to parts of Alaska and Canada and from the East Coast to the Pacific are to be found many different and interesting native or "wild" irises or iris species, all without beards but all growing from rhizomes like the bearded ones. Some have crests, more have signal patches and tiny *Iris verna*, native of the Appalachians, has a patch of down that might almost be a beard, but none have true beards and none are in the ancestry of your favorite garden pets. However, many of the native American and European species of the beardless types are worth considering for horticultural use.

In Colorado, we are less fortunate in point of numbers of different kinds of species than many other states and we are not the exclusive proprietors of our one native species. Perhaps our *Iris missouriensis* makes up for this by being sturdy and charming, though less tall, less spectacular, less varied in color than, for instance, the Hexagonae group, which is chiefly found in Louisi-

ana and less exotic in appearance than the crested group.

Iris missouriensis was first found, described and named in 1834 by Thomas Nuttall, the hardy pioneer botanist and paleontologist, whose name appears as a part of the classification of so many of our American plants and who presumably so-named it because he found it growing in the drainage areas of the Missouri River. However, it is found all the way from the Black Hills to the Pacific Coast and in the higher regions of the southwest, even the upper mountains of Mexico (the one exception mentioned earlier that appears south of the border). According to altitude and location, it may be found in bloom from late May to late June or even occasionally in early July. In fields, in open park lands, waves of it will remind you of a smiling sea.

Iris missouriensis is classified in the series Longipetalae and even some of the experts do not wholly agree whether it should be classed as a variety of *I. longipetala* (or even vice versa!) or if they are, indeed, two distinct species. However, it is generally agreed and Lawrence, in his *A Reclassification of the Genus Iris*, so lists it, that the two are separate species within the same group. *Iris longipetala* is native only to California and is chiefly distinguished from *I. missouriensis* by being generally stockier in form, having less color variation, being evergreen in the winter



IRIS MISSOURIENSIS

while *I. missouriensis* is deciduous, has a much more limited habitat and probably has a different chromosome count. It is often difficult to tell them apart and the chromosome count may need further verification (someone may be investigating this already). In the long course of evolution, they may have once been the same species and developed their minor differences as a result of a difference in location or even as the result of natural hybridization, although the latter point is debatable.

Iris montana is usually considered to be a variety of *I. missouriensis*, not a separate species, although it has smoother coloration, shorter stems, with the blooms down in the foliage and is not found, so far as we know, in the wild state in Colorado, although it has been found from Montana to the State of Washington. We might mention that a fine clone of it is being

grown in the garden of former Regional Vice President and Mrs. Charles P. Gordon, Jr., in Denver.

W. R. Dykes listed *Iris arizonica* as a separate species and for this reason others have also thus listed it. However, modern investigation reveals that *I. arizonica* might best be considered as another variety of *I. missouriensis* and is very difficult to distinguish from it.

Once in a while, those who are interested in *Iris missouriensis* become excited by reports and vague rumors that a yellow form has been found in some far place, such as the Jackson Hole country in Wyoming or a remote corner in Arizona. But, so far, reports and rumors it has been, with no actual plant being brought to the attention of collectors and botanists and the yellow *I. missouriensis* remains in the same category with the unicorn. The usual color is a gray-or white-lavender background with lavender veins giving a blue effect that at times rivals the Colorado columbine. Color variation depends on amount, intensity and smoothness of venation. We have found specimens which give a strong claret effect from a distance. At first we were not sure whether or not this was the result of local soil conditions, but experiments have shown that this color effect will remain when the plants are moved to other areas and planted side by side with the bluish ones. Albinos, or whites with no veins, are found in *I. missouriensis* fairly often, although much less frequently than the blue-lavenders.

In *Wild Flowers for your Garden* Helen Hull recommends using *Iris missouriensis* in a bog garden. It is not necessary to provide bog conditions for this plant and it may even be inadvisable. So long as it has plenty of moisture before blooming, it can tolerate quite dry conditions the rest of the year.

In the wild, it may sometimes be seen in near-bog conditions but is more often found in sunny, well-drained uplands and sometimes along old railroad right-of-ways or ditch banks. The seeds, however, must have a great deal of moisture before they will germinate and in time of drouth they will sometimes lie dormant for several seasons, waiting to spring into green life after a good rainy spell. Bear this in mind if you plan to grow them from seed and do not let the seed beds get too dry.

The reason we see *Iris missouriensis* in the mountains but not on the prairies is that these plants will not linger long when cultivation for agriculture comes in, the ground is turned or the horses and cattle roam. A few may gather at the edges of the hayfields in the mountain valleys but are seldom to be seen on the farmlands of the plains. You may be inspired to collect a few of these native sons and daughters for your own garden. If so, please use the utmost discretion and remember the rules of collecting fair play: Do not take a lone plant and if you find a sizable colony, take only a few that you know you can use or that you know you can get planted right away in a situation compatible to their needs. Fifty years from now, it would be very sad if our one native iris species were as nearly extinct as the wood lily or our little pink lady-slipper, *Calypso bulbosa*, which is rarely found in Colorado anymore except in the protected confines of Rocky Mountain National Park and then only when optimum conditions exist.

The average gardener would probably feel a greater interest in some of the less frequently grown species if they had a popular name. So-called "Dutch," Siberian and Japanese iris may be grown more frequently than our American natives for this reason. Actually, one name — whether it be Latin or

German or American — is really no more difficult to learn than another if the gardener is really interested in the flower. Yet, people seem to prefer the misleading popular or common names for flowers that vary from region to region or are applied to very different flowers. "Wild iris" is not really an appropriate identification for our native plants, for it is applied to any species growing in the native state, anywhere in the world. Nor, can we fairly call it "Colorado iris," as we have discovered, in learning what a roamer it is. The true irisarian shudders at the sound of the word "flag" when it is applied to any other species than the European water iris, *Iris pseudacorus*, which was probably the prototype of the fleur-de-lis of European heraldry and various flags. Perhaps the reason the use of this word is like waving a red flag at the leading character in the bull ring is not only that it is usually incorrect, but also because it has led so many people to have mistaken ideas about the nature and character of iris in general and the newer hybrids in particular. Or let us say that it is like the nickname the kids hung on you in grade school and that you would give anything to forget. Perhaps those who would like to grow *I. missouriensis* but find the name a mouthful should call it "the Colorado native iris." This doesn't save any syllables! Lots of charming names might be thought of, but then there would be the problem of having everyone use the same one, so irisarians will probably stick to *I. missouriensis*.

If you would like to see *Iris missouriensis* growing and blooming and don't want to go hunting for it in the mountains, get details from the Denver City Parks, Denver Botanic Gardens or members of the American Iris Society. There will be a few clumps growing in various locations in the Denver area

and these organizations can direct you to them. If this beardless lovely excites your interest in the beardless species, see those growing at Denver Botanic Gardens.

We hope this article will inspire you to branch out and find that there are many delightful kinds of iris to grow in addition to those queens of the garden, the tall bearded hybrids.

Any mention of *Iris missouriensis* should include the names of three people who are doing a great deal of careful research on the subject: Roy Davidson of Seattle, Washington; Homer Metcalf at Montana State College, Bozeman; and Dr. Lee Lenz of Rancho Santa Ana Botanic Garden, Claremont, California.

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Note: DPL indicates that the publication is available at the Denver Public Library. BG indicates that it is available at the Helen Fowler Library, Denver Botanic Gardens, 909 York Street. The general public may use the library at Botanic Gardens, but check-out privileges are restricted to members. The books specializing in iris do, of course, give more information than the general wild flower books. No one book should be accepted as final authority on the subject of taxonomy; it is better to read several and try to observe which seem to be the most accurate.

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THE RAINBOW Iris Garden at City Park inaugurated Denver Botanic Gardens' first venture in iris culture. In 1951, land at City Park near the Denver Museum of Natural History was allocated for use of the newly formed Botanical Gardens Foundation. Veteran landscape architect and planner, S. R. DeBoer, selected a site for the iris garden and his assistant, Mrs. Francis White Movitt, drew plans for the beds in rainbow outline and coloration.

Region 20 members of the American Iris Society donated plants and labor in the summer of 1955 to turn the rainbow from vision to reality. With additional planting in 1956, a total of 387 different kinds of iris flourished to make the City Park planting a focal point for iris interest and activity.

In the summer of 1960 all plants were dug for use elsewhere in the Denver city park system. Beds were excavated to a depth of 18 inches and virgin soil hauled in to guarantee maximum growth for the plants that should burst forth in glorious bloom the end of this month.

Again Region 20 members were asked to donate plants and labor in this renaissance project. Varieties were carefully selected to present the best

known, highly rated, recent introductions. Gratifying co-operation of nationally known hybridizers provided some varieties not available locally in sufficient quantity for mass planting. There are 115 kinds in the planting with an average of 10 clumps per variety.

While the majority of plants are of recently introduced varieties, one bed contains representative seedlings from area hybridizers. Also, here is the Dr. P. A. Loomis memorial bed, honoring Colorado's pioneer — and still active — hybridizer. Another bed groups border iris together. These beauties differ from their taller cousins only in height and are valuable in the garden because of their lessened stature. The late Dr. Franklin Cook, former president of the American Iris Society, inaugurated an award for the outstanding variety seen at each Annual Meeting and these President's Cup winners are arranged chronologically. Also growing in the Garden are Dykes Medal winners, the royalty of Irisdom.

While the weatherman can play cruel tricks at the last moment, given half a chance the Rainbow Iris Garden should present a spectacular display, worthy of any effort to pay it a visit.

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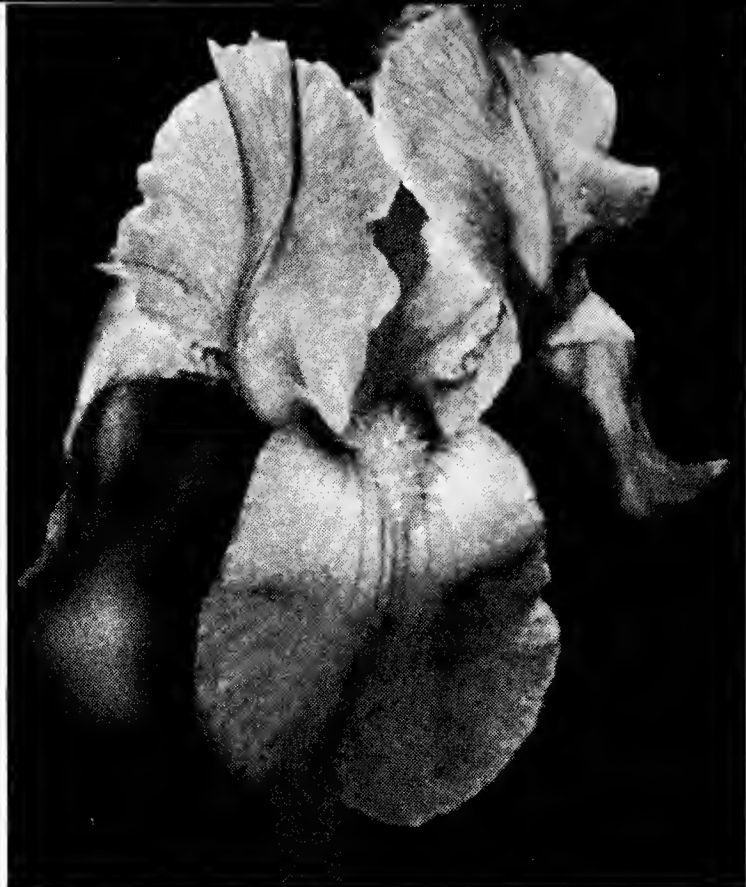
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IRIS PALLIDA

and

Related Species

L. F. and Fannie R. Randolph



I. PALLIDA

(Editor's Note: The following article is particularly timely since Denver Botanic Gardens has an extensive planting of iris species collected by the Randolphs on several trips to central Europe, the Balkans and Mediterranean areas. Many of the ancestors of today's modern iris are to be found among the 139 plants of the collection. Dr. Randolph is immediate past president of the American Iris Society. This article is an exact reprint of one which first appeared in the February, 1962 edition of the Empire State Iris Society Newsletter.)

THE CULTURAL REQUIREMENTS of garden irises have been determined by the species of wild iris from which they originated. The tall bearded irises commonly grown in American gardens include combinations of genes from a half dozen or more species, some of which are indigenous to the relatively cold climate of eastern Mediterranean countries. In the native habitats of these species natural selection has operated over long periods of time, eliminating variants not well adapted to survival in competition with other plants, and permitting the survival of those capable of competing successfully under the conditions of soil and climate prevailing where each of these species thrives. Such capabilities are inherited and each species transmits to succeeding generations the genes controlling adaptation to its particular habitat.

Among garden varieties derived from hybrid combinations of various species differing in their cultural requirements, segregation of genes controlling adapt-

ability to particular growing conditions has occurred. It is for this reason that some present-day tall bearded varieties are well adapted to garden culture in southern states and others are best adapted to the much colder climate of northern states and adjoining provinces of Canada. From the admixture of genes contributed by various species the progenitors of modern iris have segregated genic combinations making most varieties well suited to garden culture in some parts of the country but not in others. In rare instances varieties such as those receiving the highest ratings in national popularity polls for several years in succession exhibit a wide range of adaptability to different growing conditions.

The existence among modern tall bearded irises of varieties that do well in the east, others that do well in the west, others in the south and still others in the north is primarily responsible for their widespread popularity throughout the country. It is also responsible for

the disappointment sometimes experienced by persons trying to grow varieties not well adapted to their local conditions. Information on regional adaptation available from varietal comments appearing in local and regional publications, regional symposia or catalog descriptions all too often is an inadequate guide to the performance of a particular variety in the garden of a would-be grower. The popularity of recently established regional and national test gardens is proof of the need for additional information of the sort they can supply.

Hybridizers who are aware of the importance of developing varieties adapted to the varied conditions prevailing in climatically different regions plan their crosses with this objective in mind. If the desired genes are not available among existing cultivars, they may wish to utilize in their breeding programs wild species that have the desired cultural characteristics. The following observations on *Iris pallida* and related species we have collected abroad in recent years may be of some value to hybridizers considering the use of these species in their breeding programs.

The importance of *Iris pallida* as a progenitor of European diploid cultivars from which modern tall bearded irises originated after being crossed with certain Asiatic species is well known. It is generally considered to be a winter hardy species possessed of many desirable horticultural traits. This is only partly true. The larger flowered, more attractive forms of *I. pallida* apparently came from southern Yugoslavia near the Albanian border and possibly also from southern Italy where the winter climate is much milder than in the mountains of northern Italy and Yugoslavia where the smaller flowered forms are found. We will discuss the

geographic distribution and habitat preferences of *I. pallida* in more detail after considering related species about which more definite information is available.

The *I. illyrica*, of Tommasini, from Monte Spaccato near Trieste and neighboring areas of northern Yugoslavia and the *I. cengialti*, of Ambrosi, from the foothills of the Alps in northern Italy are close relatives of *I. pallida*. In their native habitats and also as they grow in our garden at Ithaca, New York, *I. illyrica* and *cengialti* in comparison with *I. pallida* have shorter, more slender stems rarely exceeding 15-18 inches in height; their flowers are definitely smaller and are in pleasing proportion to the height of their bloomstalks. These two species very nicely conform to the specifications of the Miniature Tall Bearded class of eupogon irises as defined by Lawrence and Randolph (*Garden Irises*, page 145).

Occurring in the foothills of the Italian Alps and in the mountains to the north and east of Trieste these relatives of *I. pallida* are definitely winter hardy. They grow on exposed rocky slopes in calcareous soil often so low in fertility that there is little competition from other plants. Since they are usually found on steep slopes with a south or southwestern exposure, these species must be subjected to appreciable amounts of dessication during hot, dry weather following their blooming period. In the early spring of 1954 with the head gardener at the Botanical Institute in Trieste serving as our guide, we collected *I. illyrica* on the slopes of Monte Spaccato overlooking Trieste. Except for virus symptoms which have not seriously affected their growth these plants have done very well in our garden.

On April 1, 1961, plants of *I. cen-*

gialti, Ambr. forma *vochinensis*, Paulin were collected at Bohinj, the type locality for this iris. This locality is not far from Lake Bled at a distance of approximately 125 kilometers northwest of Ljubljana near the Austrian border in northwestern Yugoslavia. Here we found this species not yet in flower growing in partial shade on limestone ledges of a steep, wooded mountain slope. Nearby in the beech (*Fagus sylvatica*) woodland, the early spring-flowering *Primula acaulis*, *Helleborus macrophyllus* and *Cardamine enneaphyllus* were in full bloom, although there was still snow to be seen here and there among the trees. It will be interesting to see how these plants perform in the very different environment of our garden where they should bloom in 1962.

Having read W. R. Dykes' account of his Dalmatian iris hunt during the early spring of 1913 (*The Gardeners' Chronicle*, May 17, 1913) in which he described specimens of *I. illyrica* growing along the sides of the valley at the mouth of which Senj (called Zengg at the time of Dykes' visit) is located, we were not surprised to find this species on the rocky escarpment bordering the Adriatic Sea just south of Senj. Here we saw many specimens in bloom, with lovely, tailored, deep blue-purple flowers borne in the axils of brown, scarious spathes on slender bloomstalks rarely more than 12 to 15 inches in height. These plants could not be considered enlargements of *I. cengialti* or intermediate between it and the much taller forms of *I. pallida* farther south along the Dalmatian coast, as reported by Dykes from observations made on his 1913 visit to these areas. However, when grown in more fertile soil they may be taller.

In the vicinity of the famous southern Yugoslav coastal resort town of

Dubrovnik (formerly called Gravosa in the harbor area and elsewhere Ragusa) when we arrived by boat from Fiume and Zadar on April 18, 1954, we found *I. pallida* in full bloom on the ledges bordering the coastal highway near the city. Also, at the source of the Ombla river just north of Dubrovnik where the rushing waters of this subterranean river burst forth from the base of a precipitous limestone mountain, the slopes above were literally covered with iris bloom in various colors ranging from pale lavender to light pink to medium lavender, rosy lavender and dark blue-purple. These plants of *I. pallida* had bloomstalks ranging up to three feet or more in height and more branched than typical pallidas, but with the characteristic pappy, membranous spathes and medium sized blooms of unmistakable pallida form — nicely domed standards and drooping falls flaring outward at the tip.

There is much uncertainty about the geographic distribution of *I. pallida* as a wild species (c. f. Dykes, *The Genus Iris*, 1913, p. 166). An attractive cultivar, it is very frequently seen in Italian gardens and in waste places obviously escaped from cultivation, throughout most of Italy from the Austrian border southward through the lake region of northern Italy, the hill country south of Florence and less frequently from there to southern Italy. In certain areas, as on the cliffs bordering the western shore of Lake Garda in northern Italy and in the Dubrovnik region of southern Yugoslavia, it appears to have been either completely naturalized for a very long time or truly wild.

Except for the localized occurrence of *I. cengialti*, Ambrosi as a diminutive and otherwise distinctive pallida type in northern Italy the pallidas most

frequently seen throughout Italy are rather uniform in appearance and closely resemble the type generally considered typical of the species.

In Yugoslavia a very different situation prevails throughout the central parts of the country the small flowered semi-dwarf forms described as *I. illyrica*, by Tommasini and by Paulin as *I. cengialti*, forma *yochinensis* are prevalent in the mountains and along the coast from the present Austrian-Yugoslav border southward at least to Senj where somewhat taller forms begin to make their appearance, according to observations made by Dykes in 1913. It is only in the Dubrovnik area that the typical form of *I. pallida*, so common in Italy, is seen abundantly along the coast of Yugoslavia.

Southward from Dubrovnik to Hercegnovi, Risan and Kotor, on a trip we made in 1954 expressly to determine how far south *I. pallida* might extend, we were surprised to find in the neighborhood of Risan and Herzegovni larger flowered types similar to such well known cultivars as Princess Beatrice, Pallida Dalmatica, Mandraliscae and Odoratissima. These varieties in comparison with most other pallida cultivars not only have larger flowers, they have a more flaring form, better substance and, as in Odoratissima, a very pleasing fragrance.

Whether these distinctive large flowered pallidas of southern Yugoslavia are truly wild or naturalized it was impossible to decide from our limited observations. But from our experience in attempting to grow them in our Ithaca garden it is apparent that they are in general appreciably less winter hardy than the more typical pallidas found in the Dubrovnik area and throughout central and northern Italy. If these large flowered pallidas are not native in southern Yugoslavia they must have

come from a similar mild climate, possibly farther south in Albania or in southern Italy, or if from the north sufficient time must have elapsed for them to become fully acclimated.

Because of the very considerable importance of *I. pallida* as a progenitor of modern garden irises — and the potential usefulness of this species and allied forms most certainly are by no means exhausted — the following comments on soil and habitat preferences are offered for what they are worth to hybridizers and others wishing to grow them for their intrinsic garden value or to use them for breeding purposes.

The reputation of the diploid pallidas as very floriferous, vigorous, winter hardy and disease resistant types is well founded, but some are much more so than others. In our garden, which is at about the same latitude or a few degrees south of the mountainous regions of northern Italy and northern Yugoslavia where *I. cengialti* and *I. illyrica* are native, these species and the typical forms of *I. pallida* growing at the present time in central and northern Italy are winter hardy, have rarely shown evidence of susceptibility to soft rot or virus symptoms and their attractive foliage is much freer of leaf spot than is the foliage of most eupogons.

As might be expected the specimens of *I. pallida* collected from southern Italy and Yugoslavia south of Dubrovnik are less winter hardy than those obtained farther north. Here they bloom in late April in advance of their usual blooming period in our garden, where they may be injured by our more prolonged and colder winters and some are quite susceptible to bacterial soft rot.

Our experience with garden culture of the diploid pallidas dates from 1932 when we had growing in our Ithaca, New York, garden the varieties Gleam, Mandraliscae, Odoratissima and Prin-

cess Beatrice from which were made the chromosome counts published in AIS Bulletin 52, p. 67, 1934. During the next few years additional varieties and species including *I. pallida* were obtained from the Cornell test garden, one of a series of such gardens maintained in the early years of the Society's history. During the more than 25 years since they were first acquired we have kept in our garden this clone of *I. pallida* and seedlings of Gleam, an attractive pale lavender of pallida parentage introduced in 1929 by Colonel Nicholls. These are typical of the more northern winter hardy pallidas; although they had larger flowers of better substance, Mandraliscae and the very fragrant Odoratissima were not entirely winter hardy in our garden. Princess Beatrice, though more hardy, would very rarely set seed and for this reason was not retained.

From our foreign iris collecting trips of 1954 and 1959 we have in our garden at the present time about a dozen very vigorous and most winter hardy pallidas, chiefly from Italy and Yugoslavia. Most of these have attractive foliage of the erect, broad-leaved, glaucous type characteristic of the species. They are very floriferous and produce attractive clumps up to 36 inches or more in height. The bloom-stalks are close branched and the flowers are borne in the axils of membranous, almost white spathes, which are characteristic of typical *I. pallida*. The much shorter *I. cengialti* and *I. illyrica* have more slender stems, scarious spathes that are tan or brownish in color and *I. illyrica* may be more openly branched than are the typical forms of *I. pallida* and *I. cengialti* from northern Italy. Both species are definitely winter hardy in our garden.

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What's In A NAME

by JOSEPH W. OPPE

THE IRISES, which include many of the choicest of horticultural plants, offer a multitude of descriptive names. The term iris, for example, was adapted from the Greek and refers to the rainbow or the goddess of the rainbow.

Many of the irises were given specific names which correspond to their native environs (geographical specific names): *Iris japonica*, a native of Japan and north China; *I. persica*, which has been cultivated for so many years,



is native to Iran or modern Persia and Asia Minor; *I. virginica* grows wild not only in Virginia, but throughout the southeastern United States. From the preceding examples, it is evident that specific names derived from geographical units do not always indicate the entire range of distribution. *Iris germanica*, though first discovered in Germany by Carolus Linnaeus, the "Father of Botany," is also found growing throughout central and southern Europe.

Many of the Latin specific names of irises are indicative of the peculiar characteristics which they display. The name *Iris foetidissima* was adapted from the Latin *foetidus* because of the very fetid or offensive odor emitted from the crushed foliage. *Iris longipetala*, as the name indicates, has long petals. The clawed standards, narrowed to a petiole-like base of an iris native to Algeria caused it to be named *I. unguicularis* after the Latin name *unguiculus* meaning finger nail or claw.

Irises may also derive their specific names from famous persons, especially



those who have made significant contributions in the field of horticulture and botany. *Iris Douglasiana*, a native of the northwestern United States was named for David Douglas, a Scot, who collected and identified plants in that area. *Iris Bulleyana* was named in honor of A. K. Bulley, British botanist and horticulturist. *Iris Wilsonii*, a native of west China, was named after Ernest H. Wilson, "Keeper" of the Arnold Arboretum and one of the greatest of the modern day plant collectors. As an example of his prowess as a collector the late Mr. Wilson, on two trips, sent back to the United States propagating material for 1193 species and varieties.

"What's in a Name" has been an attempt, on my part, to adapt the late M. Walter Pesman's "The Name

Game" to my own peculiar style of writing. I hope this attempt meets with the approval of my readers as I feel that the general format of the article is good and worth continuing.

Don't forget to read the June issue of *The Green Thumb* for information on the derivation of the specific names of the roses.

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? ? ? *Pete Ponders* ? ? ?

Dear Pete,

What about trimming iris foliage shortly after the blooming period? I notice gardeners about town trim their foliage into cute little fans. As a border it looks so artificial. Am I lazy or are they?

Happy Clippers

Dear Happy,

Iris are really unhappy when we trim, cut or hack their foliage. The plant needs this leaf area to aid in the new growth it is making for next year. Iris fanciers warn that leaves should be cut back only in late fall unless leaf spot occurs. Then the affected part can be trimmed off. Trimming in late fall hastens the spring clean-up campaign.

If you are dividing the clump, however, then clip the leaves to six or eight inches, a convenient length. If you are happy only when clipping then cut off the flowering stalk after bloom. During bloom, snap the faded blossoms



from the main stalk for that well-groomed garden.

Dear Pete,

I live in constant fear that my choice iris will be attacked by borers or some other pests or disease.

Worrisome Thing

Dear Worrisome,

Fortunately, here in Colorado few diseases or pests afflict iris. Their only requirements are sun and good garden soil with adequate drainage. In humid areas spotting of the leaves by fungus is a prevalent disease. Keeping the old leaves clipped off as they die back and the clumps free of trash so sunlight can reach all parts of the plant will do much to prevent leaf spot. Many copper and zinc based sprays or dusts are helpful. Sun not only destroys disease but at least half-day sun is essential for good bloom.

As for iris borers, our guest editors the Boulder Longs, boldly admit that many of us are iris bores, but the borer is NOT a pest in Colorado. Happy thought for the day!



Things To Do In

JOSEPH W. OPPE

MAY

MAY HAS long been recognized as the month of flowers in the United States. General John A. Logan must have been aware of this when he implemented the establishment of our first Memorial or Decoration Day in 1868. An order issued in May, 1868, by General Logan set aside May 30th as a day to decorate the graves of those who lost their lives in the Civil War.

Decoration Day in our area is also significant for another reason. "Wait until after Decoration Day" is the traditional response to the question: When should I plant tender annuals outdoors? For the most part, this "rule of thumb" is as applicable today as it was in years past.

The first half of May should be given over to the completion of projects started in April. The planting of bare-rooted, woody plants should be completed by the fifteenth. To insure success, dig a large hole and incorporate a high percentage of organic material into the back-fill. Woody plants that are balled or potted can be safely moved at any time during the year if

the proper precautions are exercised.

Perennials such as delphiniums, daisies and chrysanthemums, with a ball of earth attached, can still be moved. Those annuals and vegetables not already planted can be started outdoors from plants or seeds. Remember, it is safest to wait until late in the month to plant the tender annuals.

The first of May is the earliest practical time to fertilize lawns. Be careful not to over-fertilize as this tends to stimulate succulent growth which is susceptible to disease. If water is necessary apply it thoroughly and no more often than necessary. Experts agree that one deep watering is more useful than several light sprinklings.

If a lawn weed control program is necessary, now is the time to start it. It should be remembered, that weeds are more of a problem in a poor lawn than in a good one. Good cultural practices used to create a healthy lawn will also result in a weed-free one.

Pay particular attention to the water needs of your woody plants. These individuals, like your lawn, should be

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watered thoroughly to stimulate deep rooting.

Mulches applied at the base of woody plants and in flower beds are often the best control for weeds growing in these areas. If it becomes necessary to cultivate for weed control, make certain it is a shallow cultivation, one that will not disturb surface roots.

The mulches placed around rose bushes should be loosened around the first of May and removed between the fifth and tenth. After removing the mulch, the final pruning should be completed. The resultant bush should have 4 to 6 good canes, 6 to 8 inches in height. Roses should be fertilized and the preliminary spray or dust for insects applied, about the fifteenth of the month.

Early flowering shrubs such as lilacs and forsythia should be pruned following their period of bloom. A quantity

of the old wood should be removed each season. This will insure a new growth of young, vigorous wood which makes a healthier, more profuse blooming specimen.

Spirea, perennial phlox, juniper, roses, viburnum and spruce should be checked for aphids and red spider. If chemical sprays are used to control these organisms be sure to follow closely the manufacturer's use recommendations. The old adage "if one tablespoon is good two are better" is not acceptable when it comes to diluting chemical pesticides.

Perhaps the most interesting of all the things to do in May is to take a drive around Denver to observe the early flowering species in bloom. This should be a rewarding experience and may give new ideas on what one may plant to add color to his own landscape.

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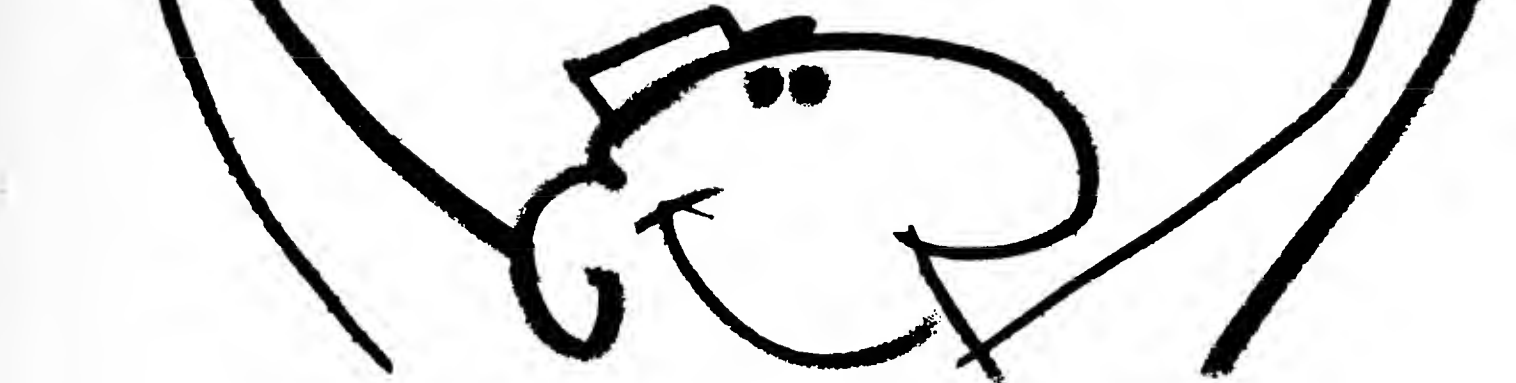
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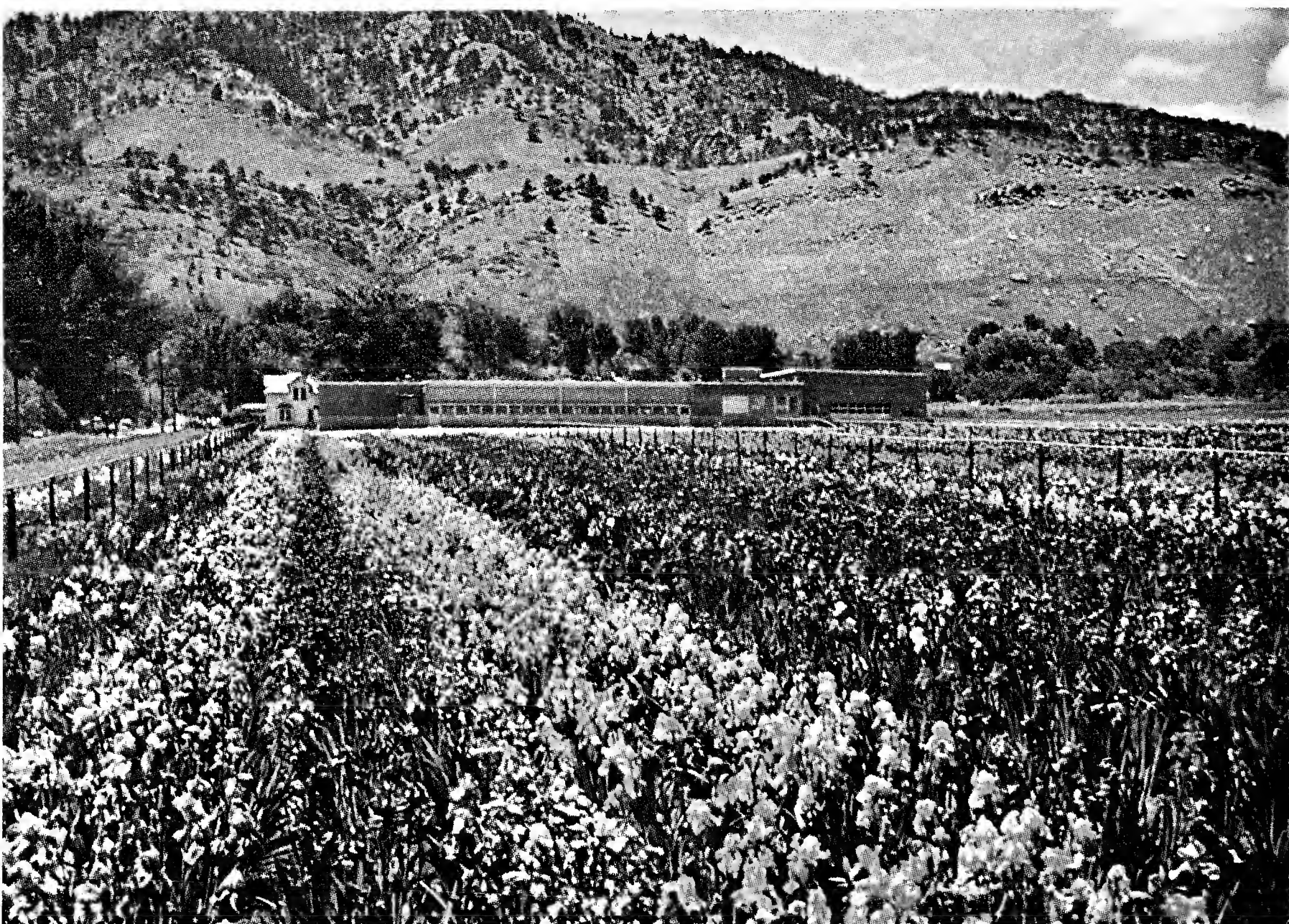
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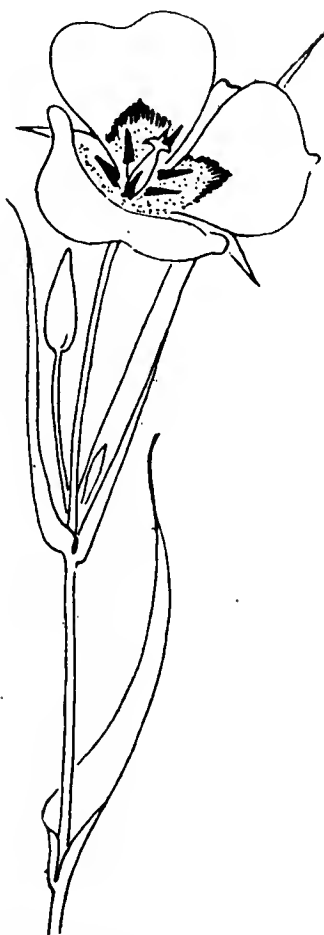
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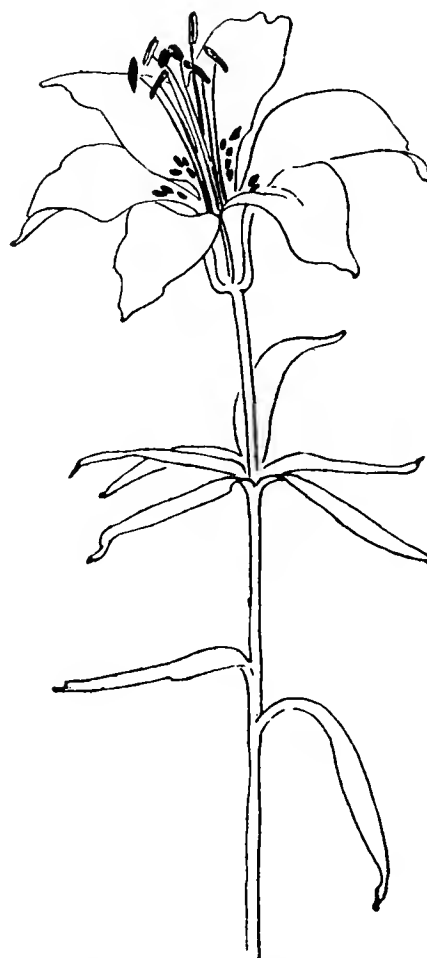
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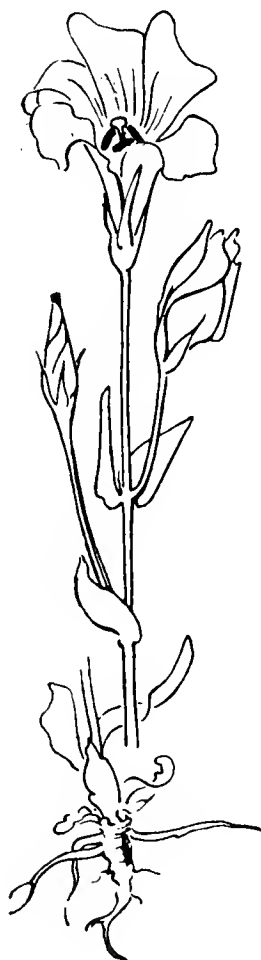
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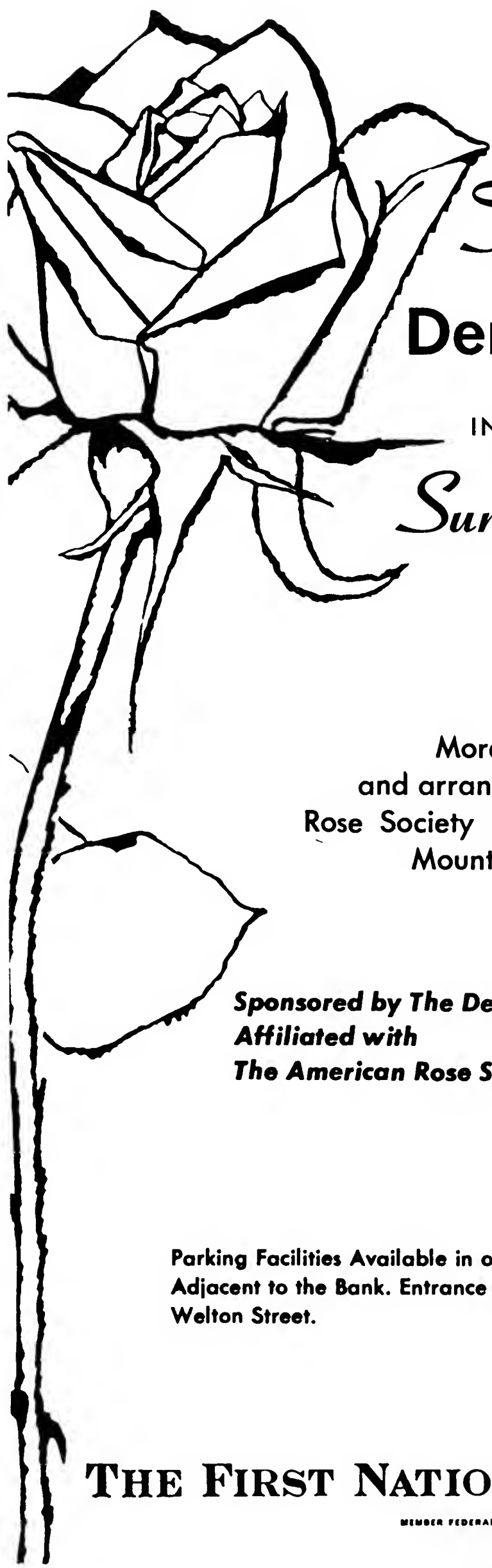
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THE COVER

Upper Left — Mariposa Lilly
Upper Right — Western Wood Lily
Center — Tulip Gentian
Lower Left — Lady's Slipper Orchid
Lower Right — Calypso Orchid
Original drawings from the
Emma A. Ervin Collection

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7 GARDENS!

The Garden of Mr. and Mrs. Walter K. Koch, 370 Ash — has the charm of a Williamsburg or Georgetown garden with wrought iron gates and fences, paved brick areas, filtered sunlight through large old trees and a fountain area. The slope of the rear garden is interestingly treated with sandstone terrace walls. Birds are made particularly at home in this garden. Maintained entirely by the owner.

The Garden of Mr. and Mrs. David Touff, 47 South Ash — surrounding the house on three sides is a gem of contemporary art. The entrance to the house of magnificent cast bronze gates and the breakfast solarium with tropical plants harmonize with the intimate garden containing many architectural features such as raised planter beds, walls and rock gardens. Everything is on a small scale to facilitate maintenance by the owner-gardener.

The Garden of Mr. and Mrs. Jack Bernstone, 265 South Cherry — is a contemporary garden reflecting the artistry of a modern painting. The plantings are a color harmony of all yellow and white against a backdrop of trees, evergreens and shrubs of wide variety of form and texture. Bronze accents of contemporary art reflect the handsome decor of the house interior.

The Gardens of Mr. and Mrs. Brown Cannon, 575 South Elizabeth — has wide expanses of grass bordered with a variety of evergreens, groves of weeping birch, Russian olive, red maples and red leaf plums beneath which are beds featuring perennials and a riot of colorful annuals — petunias, verbena, ageratum, lobelia, zinnias and snapdragons. Rose gardens of grandifloras and floribundas and a rock garden are at the entrance of the house, which is nestled amidst the spacious garden completely surrounding it.

The Gardens of Mrs. Lawrence Cowle Phipps, 3400 Belcaro Drive, are replicas of a prize winning design at the Chicago World's Fair. Extensive areas of forest sized trees, mature evergreens and intricate perennial borders were planted in the twenties when the gardens were designed. The South Garden features varying ground levels and wall heights to give the illusion of distance and elevation. In the North Garden an elongated perennial border leads to a fascinating walled garden on the right and to the tennis house below.



The Garden of Mr. and Mrs. William D. Hewit, 7 Cherry Hills Drive — though only two years old, has large evergreens and shade trees and a variety of gay annuals. Two patios, each opening from the family room, offer different views — one toward the children's play yard, featuring a strawberry barrel, the other toward the rose garden of massive stones, reached by a tiny bridge over a small pool.

The Gardens of Mr. and Mrs. Ker-nan Weckbaugh, 9 Cherry Hills Drive — a formal terraced garden with a magnificent view of the Rockies. From an elevated patio, accented with formal evergreens, steps lead to a lower terrace with a fountain. To the north of the house a formal garden of magnificent perennials and annuals is viewed from the patio. On the south, some distance from the residence, a summer house sits among the varying colors of the trees — maples, evergreens, prunus, weeping birch and Russian olives.



Buses leave the Botanic Gardens House, 909 York St., 10:00 a.m. and 2:00 p.m. Fare \$1.00.

Tickets and reservations for buses at Botanic Gardens House. Telephone: 322-9656 or 623-1133, ext. 428.

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Roses...

Propagate Your Own

CASEY O'DONNELL

YOU CAN GROW excellent, well-branched, profuse blooming rose bushes from cuttings in 12 short months and, in so doing, have lots of fun. Five years of experimenting with own-root plants, as compared with "budded" plants grown on very vigorous root-stocks, indicates these tendencies:

1. The blooms of own-root roses are definitely deeper in color, particularly during the summer or hot weather phase of flowering.

2. Bicolor varieties propagated from cuttings have less tendency to streak or mottle.

3. There is much less fading of color when own-root roses are grown in strong sunlight or very hot weather.

4. Varieties in the 25 to 45 petal range such as Sutters Gold, High Time, Golden Showers, Beaute and Helen Traubel, when grown from cuttings, open much less rapidly and last several days longer.

5. The own-root plants produce a higher percentage of well-shaped blooms typical of the variety.

6. There are no vegetative bloom centers in own-root roses. (Kordes Perfecta.)

TOOLS AND MATERIALS

1. A small supply of medium-fine vermiculite, **NOT FERTILIZED** or a quantity

of vermiculite and perlite mixed half and half.

2. A one-gallon jug with the bottom cut out or a wide-mouthed, one-gallon salad dressing jar for each cutting you want to start. (Your favorite lunch room will be glad to donate empty salad dressing or mustard jars.)

3. A supply of rooting hormone which contains indolebutyric acid. This is very important.



4. A short length of broom stick, rake handle, dibble or similar tool capable of making holes in your planting bed approximately four inches deep and one inch in diameter.

METHODS

1. Prepare the planting bed as you would for planting bare-root, budded plants. Although own-root roses can be transplanted and handled in a manner similar to commercially grown plants, you will get more rapid results by starting the cuttings in their permanent location.

2. Select the cuttings from vigorous canes (not candelabra growth) as the petals of the spent blooms begin to fall.

3. Remove the cane from the plant by cutting *immediately* below the second, third or fourth set of five-leaflets below the bloom. The distance of the cut below the bloom depends on the length of the stem. Short cuttings root just as well as long ones. Remove the spent bloom by cutting just above the highest set of leaflets, which may or may not be a five-leaflet set, depending on the variety.

4. Dip the cutting in water, then in the rooting hormone. Dust off the excess hormone. Let me repeat — this rooting hormone is important. The success ratio is at least 50% higher when a rooting hormone is used.

5. Punch a hole four inches deep in the planting bed. Fill the hole with vermiculite or a vermiculite-perlite mixture and water well.

6. After the water has drained away, insert the cutting into the center of the vermiculite-filled hole. The cutting should go at least three inches deep but not into the earth at the bottom of the hole.

7. Cover the cutting with a gallon jug pressed into the surface of the soil so as to make an air-tight seal.

8. Provide a dappled shade by using



a burlap covered frame or a section of snow fence.

9. Inspect the cutting every three or four days by removing the jug. Keep them constantly moist but not soggy.

10. After the first hard freeze, cover the jugs with earth to within an inch or so of the top. The cuttings will continue growing all winter. A few of the more vigorous may bloom inside the jug in late February or March.

11. Begin hardening-off the new plants by removing the jugs for an hour or two each day on cool, cloudy April days. Replace the jugs if a freeze threatens. (It will!)

12. After the first winter under glass, own-root roses require no winter protection. You may, of course, use a soil mound for the purpose of saving more live wood but an own-root plant requires no bud graft protection since, obviously, there is no graft to protect.

All miniatures, polyanthas, hybrid perpetuals, shrub roses, foetidas, gran-

difloras and floribundas are excellent own-root subjects. All the stronger growing, more vigorous hybrid tea roses such as Peace, Pink Peace, Charlotte Armstrong, Crimson Glory, Hawaii, Eclipse and Contesa de Sastago are equally good. The less vigorous varieties such as Twilite, Sterling Silver, Mrs. Sam McGredy, Premier Bal, Styl-ish and others which do not well endure our short growing season, intense sunlight and extreme temperature variations, are not improved on their own roots and sometimes prove difficult to start.

You may begin taking cuttings in early June, after the first blooms are spent and continue until the first hard freeze. (September, October, November or maybe even August). Cuttings started in June or early July will grow as much as two feet and will bloom several times during their first summer.

This entire procedure is simple enough to be readily mastered by anyone and yet sufficiently complicated to provide a satisfying feeling of personal accomplishment when the end result is a husky, vigorous, free-blooming plant, created by you.



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Wildflowers

MRS. EDMUND W. WALLACE

MANY PEOPLE cannot resist picking armloads of lovely wildflowers, no matter where they see them growing. Often a site, once noted for its beauty of bloom, becomes barren because the process of propagation by seed has not been understood by the well meaning pickers of the blossoms.

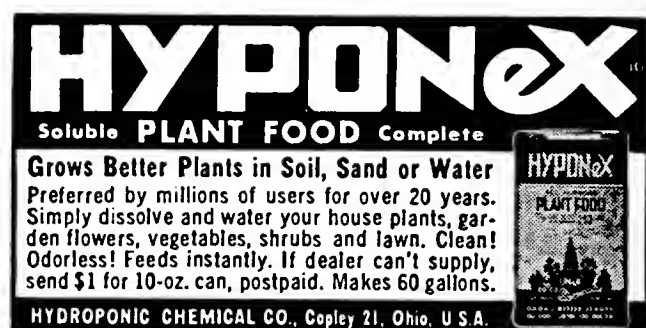
Because of this thoughtlessness, once prolific flowering annuals and perennials are already on the Colorado State Wildflower Conservation List. Many of these plants will become increasingly rare or unknown unless we cease our plunder.

The following conservation list is for your use. Look it over carefully so that you may be able to tell your friends what to avoid picking. Better still, join the group of naturalists who are refraining from picking *any* wildflowers, except those which they have been able to successfully transplant to their own wildflower garden.

Do not pick, pull, dig or in any way destroy the following plants:

Aquilegia coerulea (blue columbine, Colorado blue columbine)

Aquilegia elegantula (red columbine)
Aquilegia saximontana (dwarf columbine, alpine columbine)
Calypso bulbosa (fairy slipper)
Chimaphila umbellata (pipsissewa)
Clematis hirsutissima (sugarbowls, leather flower)
Clematis pseudoalpina (Rocky Mountain clematis, mountain clematis)
Cornus canadensis (bunchberry, dwarf cornel)
Cypripedium calceolus (yellow lady's slipper)
Erythronium grandiflorum (avalanche lily, glacier lily)
Eustoma russellianum (tulip-gentian)
Gentiana thermalis (fringed gentian)
Kalmia polifolia (pale laurel, dwarf laurel)
Lilium philadelphicum (wood lily)
Linnaea borealis (twinflower)
Primula parryi (Parry primrose)
Pyrola (Moneses) uniflora (one-flowered wintergreen, wood nymph)
Saxifraga (Boykinia) jamesii (saxifrage, Boykinia)
Stanleya pinnata (prince's plume)
Viola pedatifida (birdfoot violet)
 All ferns except bracken
 All *Castilleja* sp. (paintbrush)
 All ball cacti
 All alpenes
 All bog orchids and coral root
 And any other flower if rare where found.



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HEMEROCALLIS

JACK N. WITHERS

HEMEROCALLIS, commonly called "day lily," is not new as a cultivated flower. It was found in many European gardens during the latter part of the 1st century, A.D. The hemerocallis gets its name from two Greek words: *hemera* (day) and *kallos* (beauty); hence, it is sometimes translated "beautiful for a day." The flowers of most types remain open for one day only, closing at night, so the name is fitting. About 1830, plants were received in Belgium from Japan and later, they were collected in China. About 1890, some were being grown in England. The first hemerocallis species, including a lemon-colored one, were introduced into America about 1929.

Not until about 1934 did the American hybridizers give much attention to this flower. Each year since, more and more persons have become interested in hybridizing them. By 1948, about 300 varieties had been registered. By 1961, there were probably 8,000 varieties.

Hybridization has brought about many improvements to the hemerocallis. The flowering season, once of short duration, has now been extended over several months. The size of the flowers has been improved by crossing and recrossing. Plants have been bred to produce branching scapes with dozens of flowers.

Some of our outstanding hybridizers are Dr. Stout, Elmer A. Claar, Hans P. Sass, Dr. E. J. Krauss, Mrs. Bright Taylor, H. M. Russell and David F. Hall. Mr. Hall is credited with developing the pink varieties. Our Denver hybridizer, the late Lemoine Bechtold, came up with a spider type flower. The hybridizers are now trying to develop a type that is a repeat bloomer and also a variety that will remain open at night. Hemerocallis would be more suitable for flower arrangements than it is now if they could create one that would remain open at night.

The hemerocallis ranges in height from dwarf ones to those that are 4 or 5 feet tall. This enables them to be used to advantage in a great many places in the garden. They can be used in borders with other perennials such as iris, peonies, daisies, phlox, lupines and pyrethrum. However, much better effects can be achieved by planting them in clumps of three in a triangular form, with one plant in front and two in the rear.

Hemerocallis may be planted during any season of the year although early spring and August are the best times. Transplanting in mid-summer can be carried out if the plants are dug with a large amount of soil and watered well after planting. Most of the varieties prefer full sun for at least part of the

day. None really thrive with less than 4 hours of sun. In deep shade, the foliage is heavy but the flowers are sparse. If the soil is good and they are properly planted, hemerocallis will require less attention than many other flowers. They will even grow in poor soil but prefer one that is medium heavy. Avoid using fertilizer with high nitrogen content as this may cause a yellowing of the foliage and reduces the brilliance of many of the red and pink varieties.

The hemerocallis may be called "the lazy man's flower." They do not require much water except at planting time. It is not necessary to mulch them except in the winter. In early spring remove the dead foliage killed by the winter. Cut the flower stalks off close to the ground after flowering. Cultivate shallowly to prevent weed growth. They are almost completely free from insect pests. Thrips are the only insect that might attack them and they can be controlled by using DDT. Hemerocallis should be divided every 3 or 4 years or when the clump becomes too large. These clumps can be separated into divisions of 2 or 3 strong offshoots. Cut the tops back to about 6 inches, trim off all broken or decayed roots and then replant. Once established, they really require little care and they add colorful beauty to the garden long after the early perennials are gone.

The propagation of hemerocallis is accomplished either by using a growing portion of the plant (vegetatively) or by seeds (sexually). Propagation by seeds is the method used by hybridizers and all our new varieties are developed in this way. It is really quite simple. The pistil, with its stigma, protrudes or extends far out beyond the pollen-bearing stamens. Take the pollen from the stamens of one variety and brush it on the pistil of another variety. In

a few days a seed pod will form in the center of the flower where you brushed the pollen. When this seed pod ripens and starts to break open, gather the seed and you are ready to plant. This seed should be planted in protected beds. If you can plant them in a greenhouse you will gain one year of blooms. A few of these plants will bloom the second year.

The following is a list of some of the more popular of the named varieties. Most of these are rated in the 1961 popularity poll and will have a blooming period from June 15th to August 1st.

YELLOW: High Noon, Side Show, Capitol Dome, Revolute, Midwest Star, Kindly Light, Midwest Majesty, Little Cherub (a very early dwarf variety), Lady Bountiful (a beautiful tall one), Mrs. B. F. Bonner (a very light, almost white).

ORANGE: Cibola, Playboy, Naranja.

BLACK OR PURPLE: Potentate, Black Princess.

RED: Bess Ross, War Eagle (a beautiful late bloomer), Hearts Afire, Garnet Robe, Display, Crimson Glory, The Doctor, Mable Fuller, Marse Connell (a huge, dark red), Crimson Pirate (a very showy, dwarf variety).

PINK: Salmon Sheen, Evelyn Claar (rated #3), Cheery Pink, Pink Orchid (the first of Mr. Hall's pink varieties), Pink Damask (one of the first introduced), Show Girl, Pink Prelude, Pink Dream, Pink Imperial (the best true pink), Picture, Georgia, Grisselle.

POLYCHROME, PASTEL AND BLEND: Fairy Wings (rated first in the poll), Painted Lady, Ruffled Pin afore, Ruth Lehman, Gene Wild.

BICOLOR: Howdy, Gary Lark, Caballero.

BANDED: Quincy (a very nice, eyed variety), Nashville (the most beautiful eyed variety), Colonel Dame, Nantahala, Cathedral Towers.

GREEN THROATED: Green Goddess, Green Valley, Green Magic, Green Shadows.

Some of these special varieties run as high as \$100.00 a plant. Most of them can be purchased from \$1.00 to \$5.00 each, depending on the popularity and newness of the variety.

The author planted a plot of *hemerocallis* at the York Street Unit of the

Denver Botanic Gardens. This planting consists of about 130 named varieties and 50 plants of his own seedlings. Mr. Bechtold donated about 50 of his varieties which are planted in the same plot.

Anyone interested in *hemerocallis* should see them in bloom beginning about June 15th and reaching their peak about July 10th. The author always welcomes visitors at his home garden at 9230 Lombardy Lane, Lakewood, Colorado. He has about 150 named varieties and approximately 1,000 seedlings.



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3821 S. Broadway
Ryan Flowers
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Ed F. Schu Floral Shop
901 E. Colfax Ave.
South Logan Florist
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JUNE

Bonnie Brae Flowers
747 S. University Blvd.
Orchid Shop
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JULY

Flowers by Yvonne
2438 W. 44th Ave.
McDonald Floral Shop
508 E. Colfax Ave.

GARDENERS AND THE ALPINE TRAIL

E. H. BRUNQUIST

THE M. WALTER PESMAN Trail, in the Mt. Goliath Unit of Denver Botanic Gardens in the Arapaho National Forest, will shortly be open to visitors again. The upper end, above timberline, is at an altitude of about 11,100 feet; it is almost exactly 5 miles beyond Echo Lake on the road to Mt. Evans and has a narrow parking area on the east side of the road.

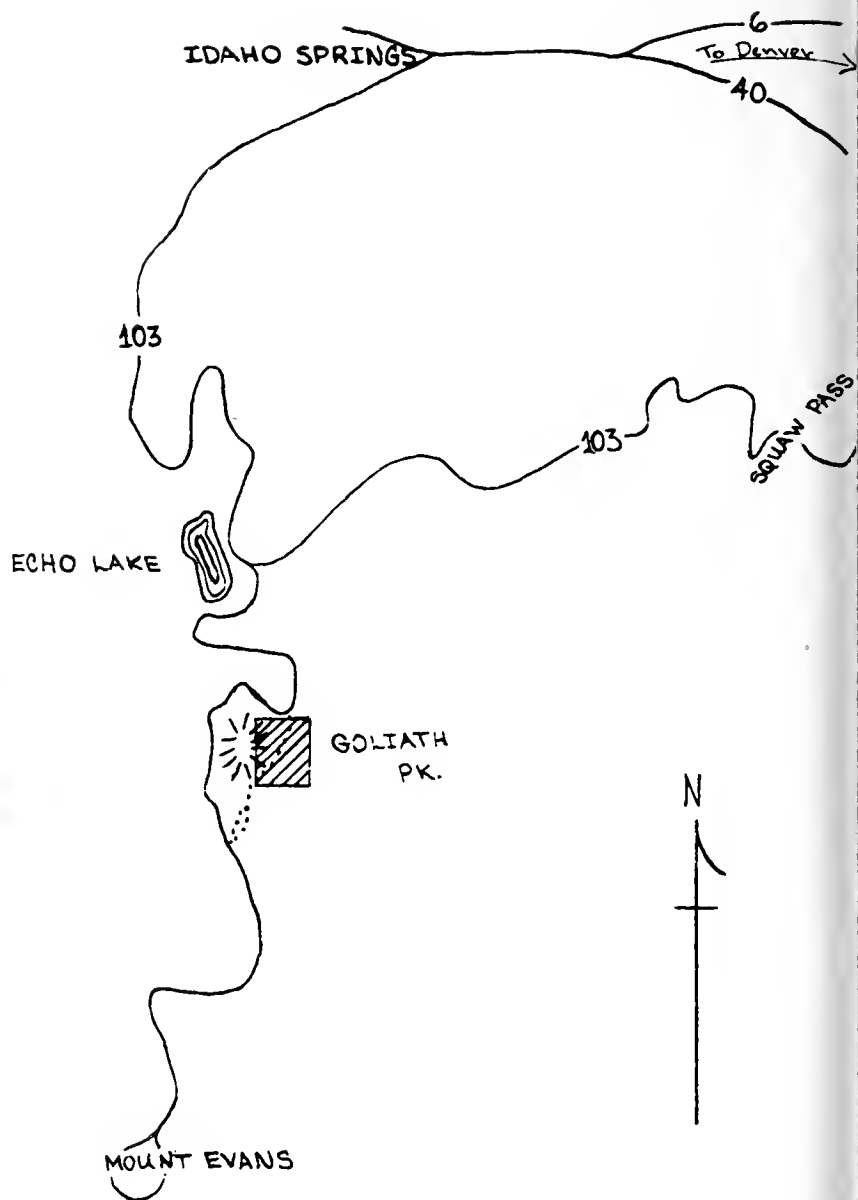
The Trail, which is about 2 miles long, descends through the timberline zone and terminates at a large roadside parking area (well marked with a large Forest Service sign) which is 3 miles on the road from Echo Lake and at an altitude of about 10,500 feet. Some of the common plants along the Trail will be labelled again this year.

Many dedicated gardeners have lacked the time for more than a casual acquaintance with wild plants and may well ask what the Trail has of interest to them. Two particularly good reasons for a visit to the area come to mind readily. Gardeners labor continuously to furnish their plants with optimal

conditions for survival and growth. What are the stresses to which plants are subjected and how may they be minimized? What are the limits of tolerance of plants to privation? Gardeners routinely deal with questions of this kind and are exceptionally qualified to appreciate the astonishing capacity of certain wild species to adapt to conditions of great stress at high altitude.

For example, tundra plants (i. e., plants growing above timberline) demonstrate to a dramatic degree a capacity to tolerate scarcity of available water and extreme and rapid changes of temperature.

A variety of conditions commonly prevail to severely hamper plant development on the tundra. Examples are: (a) A relatively small number of days completely without frost; (b) a soil frozen much of the year (needle ice,



for example, is an enemy of seedlings striving to gain a foothold); (c) a rapid draining away of rain and melting snow because of stony and gravelly soil and (d) rapid loss of water from plants by the evaporation evoked by frequent wind and hot sunlight.

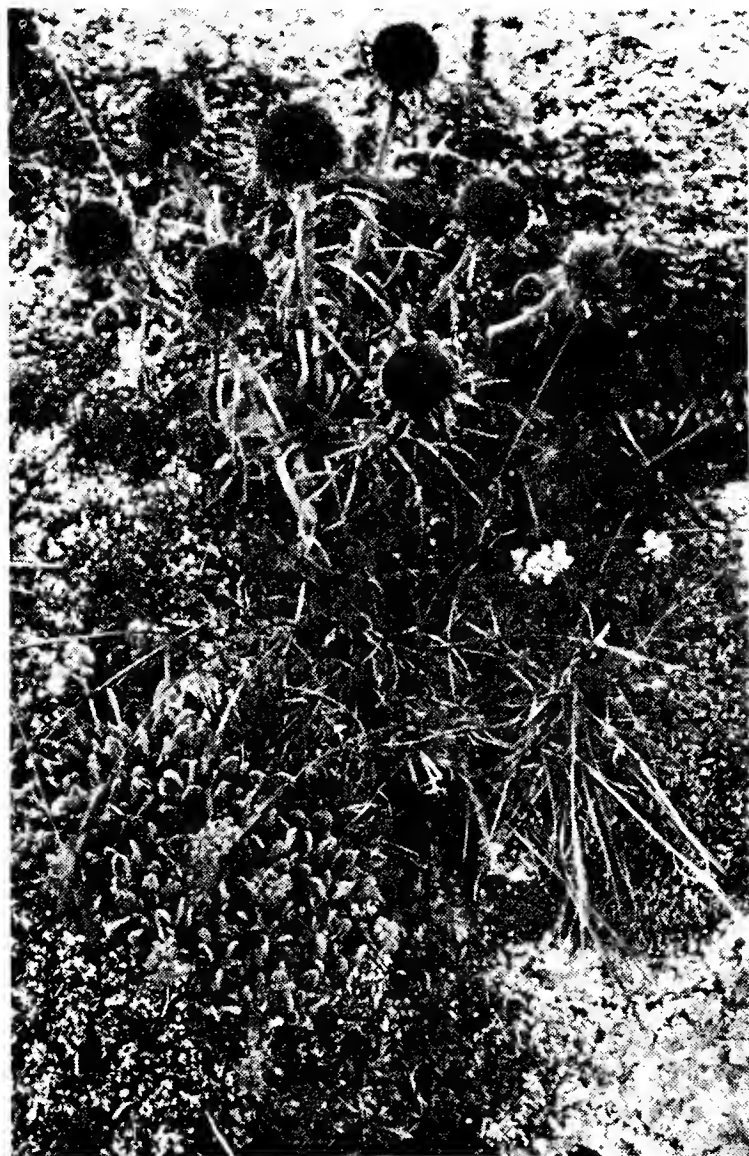
Some of the obvious results of such privations are: a short growing season; a virtual absence of annuals; slow development of flower buds (several seasons are required in the case of some species); failure of seeds to mature in many species (with consequent major dependence upon asexual propagation); the prevalence of mat plants, some of which have stout, deep-seated tap roots and may be more than a century old.

A second feature of potential interest to gardeners concerns plant-family relationships. It is true that the majority of gardeners pay but little attention to the families to which their plants belong. However, gardeners who have gradually enlarged their acquaintance with the families, seem to invariably testify that it has added a great deal to the fun of gardening. One recommended approach is to form the habit of looking up a few plants at a time as to family connections, rather than to attempt to learn the technical details of plant differentiation for the whole gamut of families. One gradually comes to have a "feeling" regarding one after another of the families and to enjoy the challenge of making a guess as to the family to which a "new" plant belongs.

The handiest reference book is L. H. Bailey's *Manual of Cultivated Plants* (last revised in 1949). But, any good dictionary (if it is not over-abridged) will serve the purpose.

There are at least 27 families represented among the plants of the Alpine Trail, which have thus far been identi-

fied. As might be expected, the daisy family (Compositae) is most extensively represented (at least 30 species in the 11 genera). Many Colorado garden plants of the family might be cited, of course, such as dahlia, zinnia, gayfeather, ageratum, lettuce, yarrow, chrysanthemum, marigold and aster.



On the Alpine Trail, the genera represented by the most numerous species are golden ragwort (*Senecio*) with 7, pussytoes (*Antennaria*) with 4 and daisies (*Erigeron*) with 4.

Second in order of number of species so far identified on the Alpine Trail, is the rose family, with 10 species in 4 genera. Common garden plants of the family, in addition to roses, are such fruit trees as apple, pear, quince, apricot, plum and cherry; such berry producers as raspberry, blackberry and strawberry; and such shrubs as spirea, cotoneaster, pyracantha, ninebark and

shrubby cinquefoil. On the Alpine Trail, the family is most abundantly represented as to the number of species by cinquefoil (*Potentilla*). Alpine avens, a species of *Geum*, is obviously the most abundant species of the family (or of any family of flowering plants) above timberline.

Nine species of the pink family (Caryophyllaceae) and nine of the figwort or snapdragon family (Scrophulariaceae) have thus far been identified on the Alpine Trail. Examples of common cultivated plants of the family, in addition to pinks and carnations, are sweet william, babysbreath, bouncing bet, cerastium and campion. Sandworts (*Arenaria*), chickweed (*Cerastium*) and

the mat plant, moss campion (*Silene*), are abundant on the Trail.

Common garden members of the snapdragon family, in addition to snapdragon itself, are foxglove, toadflax, mullein, beardtongue, (*Penstemon*) and veronica. The paintbrushes (*Castilleja*), with 6 species, are by far the most abundant members of the family on the Alpine Trail. Dark penstemon (*Penstemon whippleanus*) is conspicuous, too.

Only a sampling of the identified species on the Trail (121 in number) has been cited. A complete list, as of 1962, is on sale for 40 cents at the office of Denver Botanic Gardens, at 909 York Street.



RAFFLE WINNERS!

DENVER BOTANIC GARDENS

PLANT SALE — MAY 12, 1963

Garden Raffle

Garden Statue from Forecast Creations

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5 yards Peat and Sheep from McCoy & Jensen

Faye Dickerson

7640 King St., Westminster, Colo.

Warren's Broadcast Spreader

Mrs. Ralph Ball

300 Humbolt St., Denver, Colo.

Gift Raffle

Flowers of the Month for one year

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Jasmine Mink Collar from Jonas Bros., Inc.

Mrs. Helene Rush

960 Hudson St., Denver, Colo.

Flowers of the Month for one year

Mr. Joe McCoy

429 E. 14th Ave., Apt. 214,

Denver, Colo.

Solid Gold Pin from 14 Karat Shop

Mrs. Harold McCurdy

9845 E. Mexico Ave., Denver, Colo.

Luncheon for two at the Quorum

Mrs. John Tippit

265 S. Clermont St., Denver, Colo.

Weekly Fox Theatre Pass for two for one year

Mrs. Pat Farkas

1109 S. Clayton St., Denver, Colo.

Elitch's Theatre Pass for two for six weeks

Mrs. Charles O. Arnold

130 S. Birch St., Denver, Colo.

Dinner for two at Henritze's

Mrs. Walter Emery

2901 E. Cedar Ave., Denver, Colo.

Greenhouse Raffle

Janco Greenhouse (\$647.50 retail value)

Mr. Harry M. Biggs

1820 S. Steele St., Denver, Colo.

Roses

AT CITY PARK

VELLA CONRAD

IN 1954, the Denver Botanic Gardens planted a rose garden in City Park. The garden, which was designed by Mr. S. R. Deboer, was laid out to accommodate about 2,500 roses. Mr. Scott Wilmore of W. W. Wilmore Nurseries and Mr. Maurice Marshall of Marshall Nurseries contacted some of the larger rose growers and provided the initial plantings. Mr. Everett Nord, consulting Rosarian and official of the American Rose Society, procured Brownell roses. Through the generosity and inspiration of Mrs. John Evans and much hard work the project was started.

Many of the first plantings are still in the garden — Rose of Freedom, Madame Chiang Kai-shek, Eclipse, Rubaiyat, Charlotte Armstrong and Mirandy, to name a few. The original plans called for beds of 50 roses, 20 of one variety and 30 of another. Later, plantings of 10 roses were put in to accommodate more varieties. There are now over 3,700 roses and more than 200 varieties.

Some of the outstanding roses in the City Park Unit last year were:

HYBRID TEAS

Confidence	Peace
Helen Traubel	Oriental Charm
Chrysler Imperial	Tropicana

GRANDIFLORAS

Queen Elizabeth	Carrousel
-----------------	-----------

FLORIBUNDAS

Sparton	Frensham
Little Darling	Ivory Fashion
Texan	

In the spring of 1959 another garden was planted at the York Street Unit of Denver Botanic Gardens. All of the numbered test roses and many of the new varieties are planted there. It is indeed interesting to watch a numbered rose and see how many of the requirements it fills toward becoming an All-American Selection. Tropicana and Kings Ransom were two of the many that came to us as numbered selections. They showed outstanding qualities and were later named All-Americans.

ROSE CARE

We have had our problems too, many and varied. For the past 4 years we have tried to carry out a consistent plan of maintenance and care. Charlie Barone is our rose-keeper and he does a wonderful job. The following suggestions are based on the results of the program carried out at the City Park rose garden.

There are always many new products on the market for the care of roses — new foods, sprays and even gadgets to cover individual blossoms. Each has its place and many are excellent.

Roses are not the hard-to-grow, demanding plants many think they are.

K BABY BLAZE

TEXAS CENTENNIAL

THE DOCTOR SAN FRANCISCO

FRED HOWARD PAINSETTIA

BEN HUR GARDEN PARTY

SPARTAN GOLDEN SLIPPERS GERANIUM RED PARADE SLAW EASTER PEACH IVORY LITTLE FASHION DARLING

SPARTAN JIMINY CRICKET RED FAUBRITE PINAFORE CORAL CROWN WILDFIRE

CARROUSEL BUCCANEER

PEACE MME. HENRI GUILLOT

SHOW GIRL MERRY WIDOW PINK PARFET JOHN ARMSTRONG

GOLDEN SCEPTER CHRISTOPHER STONE

KINGS RANSOM TIFFANY

REX AUDERSON APPLAUSE

TROPICANA CHRISTIAN DIOR

PEACE SIGNORA

OPERA SUTTERS GOLD

CHARLOTTE ARMSTRONG CHIEF SEATTLE

BLANCHE MALLERIN SAN GABRIEL VALLEY LAS VEGAS

MIRANDY ROYAL HIGHNESS LA JOLLA

GOLDEN MASTERPIECE FRED HOWARD

RED CAP CAPRI SUMMER SNOW EULTIN POULSENS BEDDER

CIRCUS MIRACLE FLORADORA PERMANENT WAVE ELSE POULSEN

WHITE KNIGHT CHRYSLER IMPERIAL DAWN

GRAND SLAM J OTTO THILDW

PEACE ROUNDELAY

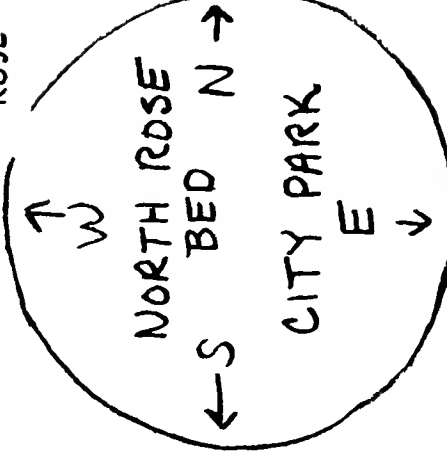
ANGEL WINGS AZTEC

FIRST LOVE PRES HOOVER ROUNDELAY

QUEEN ELIZABETH JANE BRIDE TEXAN

QUEEN O'THE LAKES PINK PRINCESS FOR VICTORY RED DUCHESS

HENRY FIELD KING BORERS WILD NEARLY WHITE PINOCCHIO RED PINK GARNETTE (MEXICALI ROSE



CHATTER FIRE OF DENMARK NEARLY WILD 30 RED PINOCCHIO YELLOW PINOCCHIO 35 SIREN MASQUERADE IMPROVED LAFAYETTE BETTY PRIOR

GOV. ROSELLINI

100

The basic rule is common sense and a system of care. They need care in the form of correct planting, properly prepared beds, deep watering and adequate feeding.

Preventative and regular spraying will take care of most insects and diseases. In this mile high area it is better to use less of the spray material, instead of more, when preparing sprays. Many leaves and buds are damaged and distorted by the application of overly strong spray solutions. Rose beds should always be watered before sprays are applied. Sprays should never be applied during periods of high temperatures. Foliar feedings that are compatible with control sprays are to be highly recommended. However, they do not replace regular feeding.

Roses prefer a neutral to a slightly acid soil. This does not coincide with the natural alkalinity which exists in most of our native soils. Such a condition can be remedied by the addition of organic matter to the rose beds. Peat moss and compost are the best ma-

terials to use. Cow manure, spaded into the soil during the fall, is good. Agricultural sulphur added to the soil at the rate of 2 pounds per 100 square feet will also help overcome this alkaline condition.

One question which is often asked is "should I cover my roses in the late fall?" The roses at the City Park and York Street Units of Denver Botanic Gardens are covered each fall with clean soil. It seems to be the only safe thing to use for the winter protection of roses in this area.

Pruning is done here in the spring and "Mother Nature" does a great deal of it. Cut the canes back to live wood and remove the small and twiggy growth in the center. At times we have had green canes above the earth mounds and the temptation is great to save all of this live wood. However, we have learned that heavy pruning produces many strong basal breaks and from these are produced the best blooms.

LEE CHAMBERS

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little-known ORNAMENTALS from the Land of the Rockies

M. WALTER PESMAN

Reprinted from "Advances in Horticultural
Science and Their Applications" Volume III

Editor's Note: The French and German translations of this abstract, which appeared in the original manuscript, have been omitted.

ABSTRACT

THE "Land of the Rockies" includes the entire high plateau in the U.S.A. from the prairie lands in the east to the Pacific Mountain range in the west, including the Rockies. It is an arid region with bright sunshine and predominantly alkaline soil. It contains a number of plant zones. Unusual plant forms fit unusual growing conditions.

Specifically discussed in the paper are plants from various plant zones. Some alpine are circumpolar, others endemic, all fascinating. The possibility of a "cold-house" with alpine conditions is intimated. Plants of the Rocky Mountain Subalpine Zone have greater possibilities for European gardens. The Montane-Foothills Zone of the Rocky Mountain region is particularly rich in shrubs, some of which have already been introduced into European gardens. Others are quite desirable but may be

less adaptable. A couple of dozen are specifically pointed out as good "candidates." Some perennials should be more widely cultivated. The Plains Zone differs most from European garden conditions: some of its soils are highly alkaline, aridity more pronounced. It is particularly rich in beautiful and striking annuals, biennials and perennials. Cacti are very numerous.

In conclusion the paper points out that:

- (1) The "Land of the Rockies" is a fertile and little explored field for plant introduction.
- (2) Some of its native plants can be adapted easily.
- (3) Others are beautiful but difficult to rear.
- (4) More research and education is desirable in view of our widening horizons in horticulture.

Let us begin by understanding each other more precisely. By the "Land of the Rockies" I mean the entire plant-geographical unit in the United States of America that consists of the high plateau extending from the typical prairie lands to the east to the Pacific Mountain range. The Rocky Mountains rise through its center from north to south. On the whole it is an arid region with bright sunshine and a soil predominantly alkaline.

To understand the ornamentals — and their culture — of this "Land of the Rockies," we must recognize a number of plant zones which it comprises. Some of these plant zones fit into our traditional horticultural thinking easily. Others require a new mental approach: we sometimes claim that "*Rocky Mountain Horticulture is Different.*" It is the title of the acknowledged source book on the region by Mr. George W. Kelly, recently republished under the name *Good Gardens in the Sunshine States*.

Without realizing it, the great majority of us (and I am one of them) are thinking of gardens and ornamentals in terms of the traditional garden climate, traditional garden soils, traditional garden methods. Let me illustrate.

An Arizona saguaro, a California Joshua tree, an African *Euphorbia ingens*, a dragon tree of the Canary Islands, an Australian goutystem (*Brachychiton*), a New Zealand tree fern — they all strike us as not quite correct — or "cricket" as the English might say. Even a monkey puzzle tree, the *Araucaria*, from Chile, still does not seem to "belong," even though we have gotten used to it. The truth is, of course, just the opposite: these trees *do belong* in their particular environment. We are amazed at them because their

environment is so very different from the one to which we are accustomed. The horticultural sphere in which we are raised is shared by millions in what we call the cultured world. It is not *per se* to be called "normal" simply because it is traditional and well-known.

If we had been living in the carboniferous age, in fact, tree ferns would have been accepted by the then horticultural societies as quite *de rigueur*. There is the crux of what I would like to stress in this paper: the "Land of the Rockies" shows not only a number of plants that are familiar to our tradition, plants that might be incorporated into our temperate humid plant geography — but it also contains plant zones that are more than just variants of the generally well-known type.

At least three important factors are involved in the creation of these unusual new departures. Our soil is different, our climate is different, our very atmosphere is different. Continued over the ages, all this has resulted into plants that are intrinsically different in their habits, their growth, their culture. For that very reason they cannot be so easily incorporated into western, temperate, humid horticulture. At the danger of being called flippant I might refer to our region as the intemperate arid, alkaline geographical plant region.

Parallel with this physiographical divergence runs a difference in the evolution of garden art.

The main stream of ornamental horticulture takes us along the path of Western culture, through its Asio-European antecedents. Rome, Italy, France, England, Holland, Germany, the Scandinavian countries, all have joined in horticultural and garden art development along the temperate humid pattern. Variations have come in

mainly due to temperature, partly to topography and textural soil differences.

Another stream of garden art, however, had its source in the more arid climates of Persia, Babylon, Arabia, possibly originating in ancient India. It joined the main stream in Byzantium and Spain and found fertile ground in other arid regions, like Mexico and the American mesas.

In the "Land of the Rockies" we find both streams of garden evolution and we find both types of plant development. (For the sake of simplicity I am, for the present, omitting the truly oriental garden movement of China and Japan and some lesser known channels as in Mexico.)

Now let us come to specifics. Our high altitude flora, above timberline, is not too unlike that of many other alpine or that of most arctic regions. Some of our identical species are found in Lappland and in the Swiss mountains. Such are *Dryas octopetala*, *Silene acaulis*, *Linnaea borealis*, *Viola biflora*, *Corallorrhiza trifida*, *Arctostaphylos uva-ursi*. All of these are listed in Schroter's *Alpen-flora* and in Lagerberg's *Svenska Fjällblommor*. Some of these are not truly alpine but occur at somewhat lower altitude. Evidently all of them must be called circum-boreal; they must be remnants of the glacial period that managed to survive in now widely separated cold spots.

A large number of these alpine are represented in various locations by somewhat different species, evidently related — an interesting study in evolution. All are fascinating in their adaptation to untoward living conditions. Many are unceremoniously called "belly-flop plants," with reference to the best human position in which to study them.

All are very difficult to grow in gar-

dens, unless special growing conditions are provided, both in summer and winter. For some types it is obligatory to construct a so-called "moraine-garden," with a constant stream of cold water flowing through the imitation detritus. In winter, deep snow must be provided or imitated.

It is my conviction that we shall see — in the future — a number of "cold-houses," in which alpine conditions can be reproduced to a very high degree: proper soil, water and drainage to begin with but much more. Modern ingenuity can provide the proper length of day, the proper day and night temperature, added actinic rays and, if necessary, reduced barometric pressure. What else could an alpine wish for? Such cold-houses would be great attractions in any botanic garden.

Among Rocky Mountain alpine the following would have particular attraction, I think: *Eritrichium elongatum argenteum*, the unforgettable blue dwarf forget-me-not; *Claytonia megarrhiza*, growing up to 14,000 ft. (over 4,200 m.) in altitude; *Primula angustifolia*, fairy alpine primrose and *Primula parryi*, growing only next to running water; *Gentiana romanzovii*, a greenish-white gentian; *Lloydia serotina*, the tiny whitish Alp-lily and *Polemonium viscosum*, interestingly called sky pilot. Sure to attract attention is a yellow composite, *Hymenoxys* (*Rydbergia*) *grandiflora*, with the common name sungod or old-man-of-the-mountain, with its vertical flower emerging from silky leaves. All these are spectacular plants, well worth a great deal of trouble to grow (and you will be sure of the trouble)!

Much greater possibilities for European gardens have the plants of the Rocky Mountain Subalpine Zone, just below timberline, which in Colorado is about 11,500 ft. (3,500 m.). It cor-

responds to the Hudsonian Zone (60° to 66° latitude).

Here, after all, we have similarity in rainfall, soil moisture, climatic conditions and even a more or less acid soil, quite unlike that of the lower altitudes. Plants find most everything to their liking; they grow lush. Once introduced, they should thrive in the northern European gardens. (We have even sent some seeds of Engelmann spruce to Iceland, hoping to help establish evergreen forests.)

Among perennials we find fascinating plants that like wet feet: foremost in interest among them is the little red elephant (*Pedicularis* or *Elephantella groenlandica*); its flower is a striking imitation of a miniature elephant's head. Close to them we are apt to find white and green orchids (*Habenaria*), shooting stars (*Dodecatheon* sp.) and later in the season, a number of gentians (*Gentiana*, *Swertia* and *Pleurogyne*). Tall *Delphinium* and *Aconitum* and the decorative *Mertensia ciliata* would make interesting additions to European flower borders. *Castilleja* sp., Indian paintbrush, in red and whitish and *Penstemon* sp., beardtongue, predominantly blue, some red or whitish, are practically unknown in Europe and very widespread in the Rocky Mountain region. *Castilleja* will be difficult to introduce, since it is semiparasitic. *Penstemon*, on the other hand, should become a valuable addition to the flower border.

Three or four shrubs, typical of the Rocky Mountain Subalpine Plant Zone, should be better known in other regions. One of them, *Potentilla fruticosa*, has arrived already, in a number of varieties or clones. It is a small shrub that can stand many untoward conditions; its yellow blossoms all through the summer are most welcome.

Sambucus (microbotrys) or *pubens* is

good for its bright red fruit as well as for its white blossoms (not flat-clustered as most elders). Unfortunately its berries are not edible. Swamp honeysuckle, *Lonicera involucrata*, has no outstanding ornamental qualities but it is interesting for its red involucre and twin black berries.

Sorbus scopulina, the shrub mountain ash, at a little lower elevation, will eventually be much wanted for its informal habit and its colorful berries, which follow white flower trusses. It should not be too difficult to "domesticate."

(Continued in the August - September issue of *The Green Thumb*.)

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Cacti for a SUNNY WINDOW

EDGAR SHERMAN
Colorado Cactophiles

A CACTUS grown in a sunny window makes the ideal house-plant for the apartment dweller, the shut-in or the person who has little time to care for plants. Those species which can be grown may be chosen from among the many genera beloved by cacticulturalists.

Plants should be selected for their grotesque form, fascinating spines or oddity of growth, rather than for their blossoms — if and when they bloom. Many cactus blossoms rival or even surpass the orchid in coloring, texture and complexity. Unfortunately, most of their blossoms are ephemeral and many bloom only at night. Some are inconspicuous but are followed by fruits that remain for weeks. On other plants, a drab, mediocre flower will appear, die and months later a brilliant seed pod will arise from the withered blossom. Far too few cacti bloom or produce fruit under ordinary amateur handling. But, this should not deter the interest in these desert dwellers which have so many other attractive characteristics.

The prevalent idea that cacti will grow in any soil, without water and with no care, is a mistake. So is the attempt on the part of many amateurs to reconstruct the exact soil and climatic conditions of their native home.



Cacti grown in pots need a very porous soil that will drain rapidly and yet retain some moisture. A soil which has a pH of between 6 and 7 is desirable. It should also be low in nitrogen and high in phosphorus and potash.

A good potting mixture consists of 2 parts well-rotted leafmold, 2 parts sharp, gravelly sand (with dust screened out) and 1 part good garden loam. To a bushel of this mixture add $\frac{1}{4}$ bushel of pea-sized, crushed clay brick or granite chicken grit (also with all dust screened out) and 2 handfuls of oyster shell.

When potting, use a pot only slightly larger than the stem of the cactus or place several small plants in the same

pot. There is a lot of nonsense printed about the material used for pots. It isn't the pot, it's the soil mixture that counts. Any container having drainage holes, even tin cans, may be successfully used.

Watering is a matter for individual judgment. In their native habitat, most cacti grow fairly distant from one another. This gives their roots room to spread over a wide area and allows them to rapidly absorb every drop of water that falls, even the desert dew. With roots restricted in a container, watering becomes a matter of great importance. They cannot endure a water-soaked soil, yet they must have moisture. Very little water is needed during their winter period of dormancy. However, an ample supply should be provided during their growing season (early March until mid-September).

With few exceptions, all cacti are sun-lovers. However, when grown in a south window they should be shaded during the midday hours from the burning rays of the sun. None of the species suitable for window sill culture will endure cold much below 40 degrees F.

Only a few of the species suitable for growing on window sills can be described here. They are listed under their common names, by which the grower will come to know and love them. The botanical names are also given, as reliable cactus nurserymen and dealers use the botanical nomenclature in their catalogues.

MEXICAN OLD MAN is covered completely with long white hair instead of spines. This favorite is at its best when 4 to 12 inches high, although it ultimately reaches a height of 40 feet in about 100 years and blooms only when mature. (*Cephalocereus senilis*)

GOLDEN BALL features broad, stiff and sharp spines of a brilliant yellow. These spines all point downward in intricate and intriguing clusters

which almost hide the green stem. Flowers arise, apparently undeterred by indoor conditions, from a white, wooly nest at the very crown of the plant. In its native habitat this cactus forms an unsightly, 4 to 6 feet plant. But, young plants are beautiful and it takes many years for them to outgrow window sill size. (*Echinocactus grusoni*)

RAINBOW CACTUS never grows too large for a small space. Its cylindrical stem is covered with alternate bands of grey and red spines. Each band is about 1/4 inch wide. Offshoots, toward the top of the stem, appear first as a vivid green. They soon assume a glowing pink color but eventually take on the characteristic grey and red banding. (*Echinocereus rigidissimus*)

TOTEM POLE is a monstrosity seemingly carved from dark green wax. It is perfectly smooth except for a few bumps and is entirely devoid of spines. Rare in private collections, this cactus is one the grower of "oddities" should have. It grows slowly but even the small plants are interesting. It is at its best when about 12 to 14 inches high. (*Lophocereus schottii monstrosus*)

OLD WOMAN CACTUS is globular and from 3 to 4 inches in diameter. It is covered with very fine, silky white hair which swirls around the body of the plant. This hair seems to stand upright around the crown in a sort of windswept hairdo. Small plants are usually without a great amount of hair but a few years growth brings an abundance of this woman's "crowning glory." (*Mammillaria hahniana*)

SILKEN PINCUSHION soon clusters and fills quite a large pot with plants the size of golf balls which are covered with silken hairs. Each filament is cruelly barbed and forms a solid mat through which protrudes many sharply hooked, reddish spines. Both hairs and spines will catch on curtains,

clothes or fingers. When embedded in fingers, the wound inflicted is very painful. (*Mammillaria bombycina*)

TORCH CACTUS is one of the taller cacti, reaching a height of 14 to 16 inches within a few years. It is crowned with an abundance of white wool, although little wooliness is noticeable on the stem. (*Cleistocactus strausi*)

GOLDEN STARS is a clustering plant. The clusters are 1 inch in diam-

eter and several inches high. They are covered with golden spines arranged in star-like formations which glisten in the sun. It needs to be divided frequently. (*Mammillaria elongata schmolli*)

The above list represents only a few of the many cacti suitable for window sill gardening. However, they should serve to give the novice a good start and may remind the more advanced amateur of some beauty or oddity overlooked.

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Signs of the Plant Sale . . . The Traffic Stoppers

Robin Long wishes to thank Pat Gallavan, the "artist extraordinaire" of the large sign.

Ragnar Bramberg, who found the sign frame in the garage attic.

Howard Thrall, the construction man who "framed it."

Lucian Long, who was the artist for the smaller sign.

To all of the gardeners who "planted" them.

Tome Pade, who focused his KLZ-TV news camera on the sign for the Saturday, May 11th, 10:00 p.m. news.

Believe it or not, the material for these signs cost the grand sum of \$3.00, a few good laughs and smiles for everyone.

Fossil Plants

Of The Denver Area

DAVID W. TREXLER
Colorado School of Mines

Fossil plants have been recognized in the Denver area since about 1870. This earliest interest in paleobotany stems from the fact that most of the geologic horizons in which plant remains are found are associated with deposits of commercial clay and coal.

The oldest known plants occur in the Dakota sandstone (100 million years old) of the Cretaceous Period. This geologic formation consists of two prominent sandstone units separated by black carbonaceous shales. Most of the plants, which occur as leaf impressions, are found associated with the black shales. G. L. Cannon (1893, p. 248)* reported the occurrence of "willow, aralia, buckthorn, sassafras, laurel, poplar, oak, myrtle, etc., with some species of a warmer climate such as palm, fig and magnolia." Lesquereux (1883) gives a detailed description of the fossil species. The Dakota formation was deposited near the shoreline of an extensive sea which stretched from the Gulf of Mexico to the Arctic Ocean during the Cretaceous Period. As indicated by the fossil plants and the associated animal fossils, climatic conditions were much more humid and warmer than today. Outcrops of the Dakota formation can be examined at many places in the foothills west of Denver. The Dakota

sandstone forms the high hogback (ridge) just east of the town of Morrison. Good exposures can also be found in the roadcut on the Alameda highway just east of Red Rocks Park and along Turkey Creek southwest of Soda Lakes.

A very abundant fossil flora has been found in the Laramie formation (80 million years old) of the Cretaceous Period. The Laramie formation consists of sandstones, clays and coal, deposited on a broad coastal plain following the withdrawal of the extensive Cretaceous sea. All of the coal and the deposits of brick-clays of the Denver region are in this geologic unit. The fossil leaves are most abundant in the lower sandstones and clays. According to Cannon (1892, p. 251) there is "a semi-tropical vegetation . . . of elm, oak, maple, beech, button-ball, birch, willow, walnut, hickory, redwood, hazel and poplar, associated with the leaves of a more tropical nature, such as magnolia, fig, cinnamon and palmetto. Numerous beautiful ferns and some fossil fruits, supposed to be those of a species of palm, are common fossils." Evergreens have also been reported. (For a detailed description of species refer to the reference by Knowlton for 1922.) The Laramie beds can be examined at several localities near Denver: (a) in Leyden Gulch (just east of Highway 93, about

*See references at the end of this article.

5 miles north of Golden), (b) in numerous clay pits on the east side of Highway 6 to the west and south of Golden, (c) in clay pits on the west flank of Green Mountain and (d) on the north flank of Mt. Carbon (3 miles east of Morrison).

The youngest fossil plants of the Denver area occur in the Denver formation (65 million years old) of early Tertiary age. A variety of leaf impressions of palms, magnolias, figs, poplars (Knowlton and Berry, 1930) and considerable silicified wood (mostly palm stumps) have been found in the clays and sands of the Denver formation. These strata were deposited under semi-tropical conditions on broad flood plains of eastward flowing streams during and following the uplift of the Front Range. Good exposures are present on the west and south flanks of South Table Mountain (east of Golden) and on the northwest slope of Green Mountain. The Denver formation also crops out or underlies the surface gravel deposits in most parts of the City of Denver.

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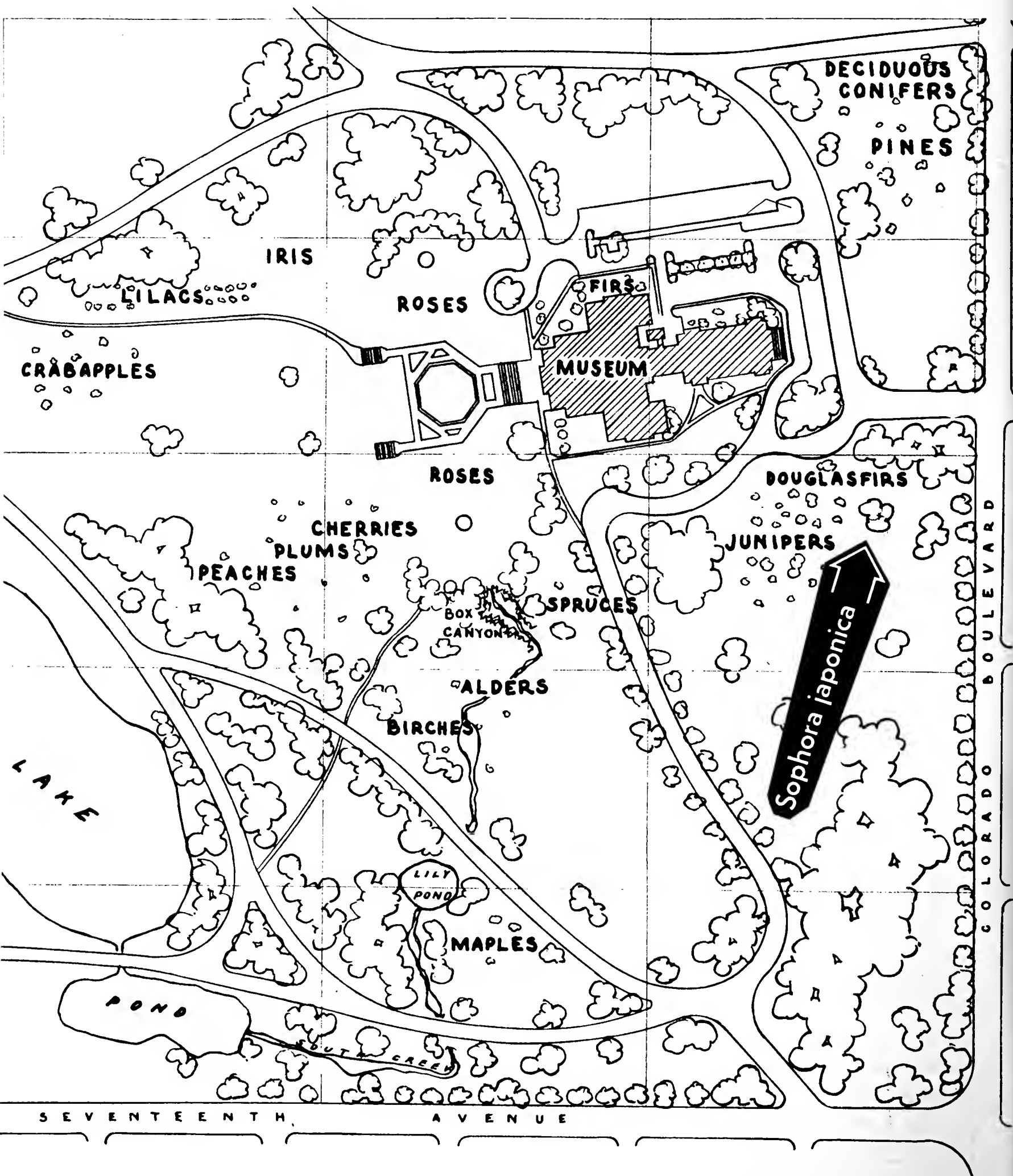
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Unusual Trees

in the Denver

Botanic Gardens

JOSEPH W. OPPE

TWO FINE SPECIMENS of the Japanese pagodatree (*Sophora japonica*) may be seen growing at the City Park Unit of the Denver Botanic Gardens. (See map for location.) A native to China and Korea, the pagodatree has been introduced into many parts of the United States for use as an ornamental tree.

A member of the pea family (Leguminosae), it is recognized by its pinately-compound leaves and yellowish-white, pea-like flowers which are borne in upright clusters during the late summer. The fruits are pea-shaped, about 2 to 3 inches long and have a tendency to remain on the tree throughout the winter. Its growth habit is rounded and wide branching with mature specimens seldom exceeding 60 feet in height.

In the eastern United States, the pagodatree grows exceedingly well un-

der adverse city conditions and is frequently used as an avenue tree. There is also a weeping variety with pendulous branches. This pendulous variety seldom flowers but may be used as a formal specimen.

The vetchleaf sophora (*Sophora viciifolia*) might also be considered for planting in our area. This species of *Sophora* is smaller than *S. japonica*, usually not over 7 feet high and is a more profuse bloomer. The flowers are produced in June and are bluish-violet to whitish. Very little is known about the culture of *S. viciifolia* in Denver but in other localities, where it is successfully grown, it seems quite well adapted for sandy and dry situations.

After noting the excellence of the City Park Unit specimens, I am of the opinion that the Japanese pagodatree, though supposedly not hardy, should be given a trial in the Denver area. It is probable that the two specimens in the City Park Unit represent a strain hardier than the type. Vegetative reproduction of these hardier strains could possibly produce a tree of diverse use for the Denver environs.

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What do you know about

The Plains

Conservation Center?

MORAS L. SHUBERT
Department of Botany
University of Denver

WE ARE SO OFTEN attracted to the dramatic scenery of the mountains or to the spectacular events in the urban areas that we overlook the subtle beauty and excitement of our grasslands. In fact the reason why so many people pass off the high plains area as "a monotonous landscape" is that they have not had a chance to really become acquainted with it. In the wide expanses of the landscape one needs a chance to sit quietly on a hilltop and enjoy this environment through all of his senses in order to appreciate the *sight* of an amazing amount of wildlife activity, *to hear* the sounds of birds and insects, *to feel* the warmth of the sun and the coolness of the breeze and *to smell* the sweet fragrance of the grasses and flowers. Have you ever driven slowly, less than 20 miles per hour, down a quiet country road with all of your windows open? Try it! Watch the meadow larks that seem to have a special song for you as you pass their fence-post perches. Notice the great numbers of hawks and perhaps you will be fortunate enough to see one swoop down to catch a field mouse. If you are observant enough you should see rabbits, ground squirrels, possibly a prairie-dog town and maybe even a herd of pronghorns. To one who has

not yet become familiar with the ecology of the grassland, it is a distinct revelation to see how much activity there is among the grass-eaters and their predators. But if you have only seen this landscape while travelling across it at 65 miles an hour, you have a right to your false conclusion that it is monotonous.

But the purpose of this report is to announce to you who are interested in outdoors activities that an exciting project has been developing which will make it easier for more people to be introduced to the life of the plains. This project is the outgrowth of action taken 15 years ago by members of the West Arapaho Soil Conservation District when they obtained 2000 acres of land which had been declared surplus to the federal government's needs. The area, immediately southeast of Buckley Airfield, is adjacent to the huge bombing range east of Denver. In recent years this land has been used to some extent for graduate research in ecology by students from the University of Denver, for nature study by other groups and for conservation demonstrations. The feeling has been steadily growing, however, that a more intensive program should be instituted to make it possible for more people to get

the benefit of study and enjoyment potentially available.

This feeling gave birth to the idea of a Plains Conservation Center which would be "neither a park, zoo nor a museum but an outdoor laboratory preserved in its natural state for people of all ages." This led to the incorporating of the Plains Conservation Center Association, a Board of Trustees, for the development of plans for a dynamic program of physical improvement of the area and of organized educational activities.

At the present time there are no buildings on the area. Consequently, the top priority item is the proposed building which will provide appropriate shelter, meeting rooms, office space and storage room. It is planned to lay out new roads and foot trails to facilitate service activities and to provide access to specific study areas.

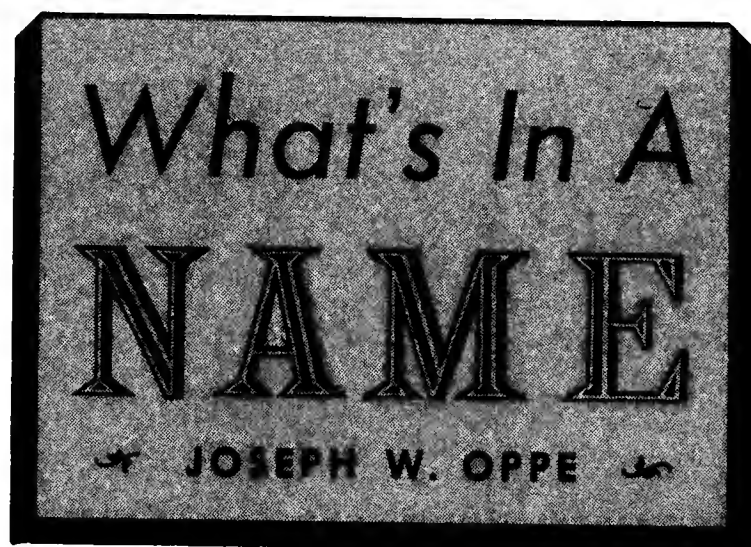
Schools and youth organizations will be particularly encouraged to study there, although it is hoped that adults, independently or in organized groups, will make use of the area. It is anticipated that very soon a permanent staff will be needed to guide and supervise.

It is hardly necessary to point out that the value of such a protected area is already great but that as the metropolitan areas grow its importance will be ever-increasing. Young people from our city environments will benefit tremendously from the opportunity of nature study at the Plains Conservation Center. It will provide the desperately needed chance for them to learn about our dependence on the good earth (forgive me) *at the grass mats level!*

You will want to drive out to the site and see where this project is developing. The easiest way to find it is to go east on East Sixth Avenue (which is Colorado 30) past the north side of

Buckley Airfield. Make a note of your mileage as you pass the main entrance gate of the airfield and then drive approximately 5.5 miles further on the paved road, which curves gradually to the south. There are no other paved roads or turns, so you cannot get lost. Watch for the entrance (a red steel gate), which will be on your right side. If you should get to an intersection where the pavement turns to the east, you have gone about 2 miles too far! It is all right to drive into the area but please do not drive off the prepared roads (which are surprisingly good ones) because the compaction of automobile wheels does long-lasting damage.

Those who are interested in further information or would like to offer help of any kind are invited to write to Mr. Winston Howard, one of the Trustees, whose address is 1900 First National Bank Building, Denver, Colorado.



MANY OF THE ROSES, in common with other plants, have derived their specific names from geographical areas. These geographical specific names usually correspond to a part or all of the range of distribution of the species.

Rosa cathayensis, a native of China, derived its specific name from Cathay, the old western European name for

China. The term Cathay was itself, derived from the Tartar word *Cataya*. The French rose (*R. gallica*), occurs natively throughout Europe and west Asia. Its specific name comes from the Latin *Gallia* (French, *Gallus*) which refers to the inhabitants of ancient Gaul. The area covered by modern France roughly corresponds to that territory once occupied by the Gauls. Some of the roses which are native to the United States have specific names adapted from the names of states in which they occur: *Rosa carolina*, native from Maine south through North and South Carolina to Florida and west to Kansas; *R. virginiana* grows naturally from Newfoundland, south through Virginia to Alabama and west to Missouri.

The roses display a diversity of Latin specific names which illustrate certain prominent characteristics. *Rosa palustris* has a specific name derived from the Latin *palus* (marsh) which corresponds with its ability to grow in swampy or marshy localities. *Rosa pomifera*, because of its large fruit, was given a Latin specific name which suggests this (Latin for apple is *pomum*). *Rosa odorata*, as the name implies, is odoriferous with an odor resembling that of tea. *Rosa sempervirens* was aptly named because of its evergreen nature. *Sempervirens* was derived from two Latin words: *sempiternus*, which means always, and *virescens*, which means to grow green. Thus, *R. sempervirens* always grows green or is evergreen.

A number of famous personages of the plant science fields have had roses named for them. The following represents two who have been so honored.

Rosa Banksiae was named in honor of Lady Banks, the wife of Englishman

Sir Joseph Banks (1743-1820) who was one of the greatest of all the 18th century plant explorer-collectors. Perhaps the most interesting and productive part of his career was his journey with Captain Cook on the latter's trip around the world. The plants collected on this expedition added much in the way of information on plant distribution and brought to light many obscure or unknown species. His personal collections, which are preserved in British museums, were the basis of many important taxonomic works and are still used by plant scientists. Banks, who introduced many new species into England, was responsible for the introduction of *Rosa chinensis*. This rose, along with *R. multiflora* var. *carnea* and *R. odorata*, was the forerunner of many of our modern cultivated garden roses.

Rosa Brunonii, native from the Himalayas to west China, received its specific name from Robert Brown (1773-1858), the Scottish botanist whose contributions were so important to the development of plant geography. Brown, on the recommendation of Sir Joseph Banks, served as naturalist for an 1801 expedition to survey the flora of the Australian coasts. His Australian work, along with the subsequent findings of Joseph D. Hooker, provided some of the floristic support for A. Wegener's "Theory of Continental Drift." This theory, which has caused great speculation in the fields of science, suggests that the continents were once connected into one solid mass which later broke apart and drifted into their present positions.

The hawthorns also have interesting names. See the August-September issue of *The Green Thumb* and find out what some of them are.



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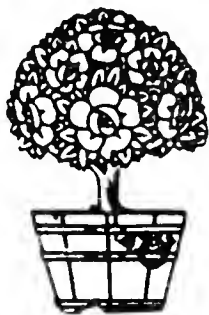
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Original drawing from the
Emma A. Ervin Collection.

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Colorado Wild Flowers by Harold and Rhoda Roberts (a museum pictorial).....	1.25
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PLANT SALE Roundup

ROBIN LONG

AFTER MONTHS of preparation the big days arrived, sunny, warm and a bit breezy, Saturday and Sunday, May 11-12, Mother's Day week-end. All in all it was a big success, making a net profit for Denver Botanic Gardens of almost \$4,000.00. So much was sold out the first day that additional plants were secured for the second day.

Certainly a big factor in the success of the sale was the cooperation of so many dedicated persons, many of whom put in long hours and much effort both before and during the sale and the wonderful generosity of many, many donors.

Although it is impossible to relate my full appreciation to everyone who deserves it, my special sincere thanks goes to my wonderful friend and co-chairman, Fran Morrison, whose untiring efforts helped make the plant sale a success as well as fun. Thanks, also, to Dr. Hildreth for his understanding and good humor and to the entire staff for their cooperation — Helen for helpful suggestions; her husband, Ed, for his help at the sale; Beverly for art work on the fliers and in *The Green Thumb*; Joe, who came to the rescue many times; and Freda, his wife, who got so sunburned selling Coke.

A brief mention for other jobs well done: Pat Gallavan, artist extraordin-

aire, auctioneer and master of ceremonies. Mrs. Ed Honnen, Mrs. James Waring and Mrs. George Garrey for their suggestions, assistance and moral support. Mrs. Alexander Barbour and Mrs. Dart Wantland for collecting antiques. Mary Carroll for "spreading the word" to so many groups. Dorothy Carroll for pitching-in in so many places. Wendell Keller, who missed his Sunday breakfast at the crack of dawn to pick up a truck load of plants donated by Bill Gunesch of Park Floral. Ken Wilmore for the first nursery donations. Jerry and Jim Layden and son Toby, for their many activities at the antique tent. Knobby Brown and Mary Filley for being on the spot to enroll new members. Clyde and Mrs. Learned for their fine supervision of the annuals. Elna Gibson and Bernice Petersen, the hardy perennials who are always a plus in any one's column. Earl Sinnamon who switched from tree trimming to auctioneering and bought some of the merchandise himself rather than sacrifice it. Joedy Arnold and the Denver Botanic Gardens Guild for the innovation of the many herbs. Members of Around the Seasons Garden Club for the big money makers, border and special plants. My husband, Lucian, who was available for many assignments.

For the first time this year special

orders were accepted in advance of the regular dates and many of the publicized plants were sold out long before the sale.

Another big factor in the success of this sale was the wonderful publicity offered by newspapers, radio and television. Special emphasis should be placed on the Rocky Mountain News article by Pat Hanna; radio coverage by Kathy Piper, Bill Barker, Kaye Howe, Pete Smythe, Ron Palmquist and Steve Hunter; and television coverage by Tom Pade, Jody Noll, Len Berman and Herb Gundell.

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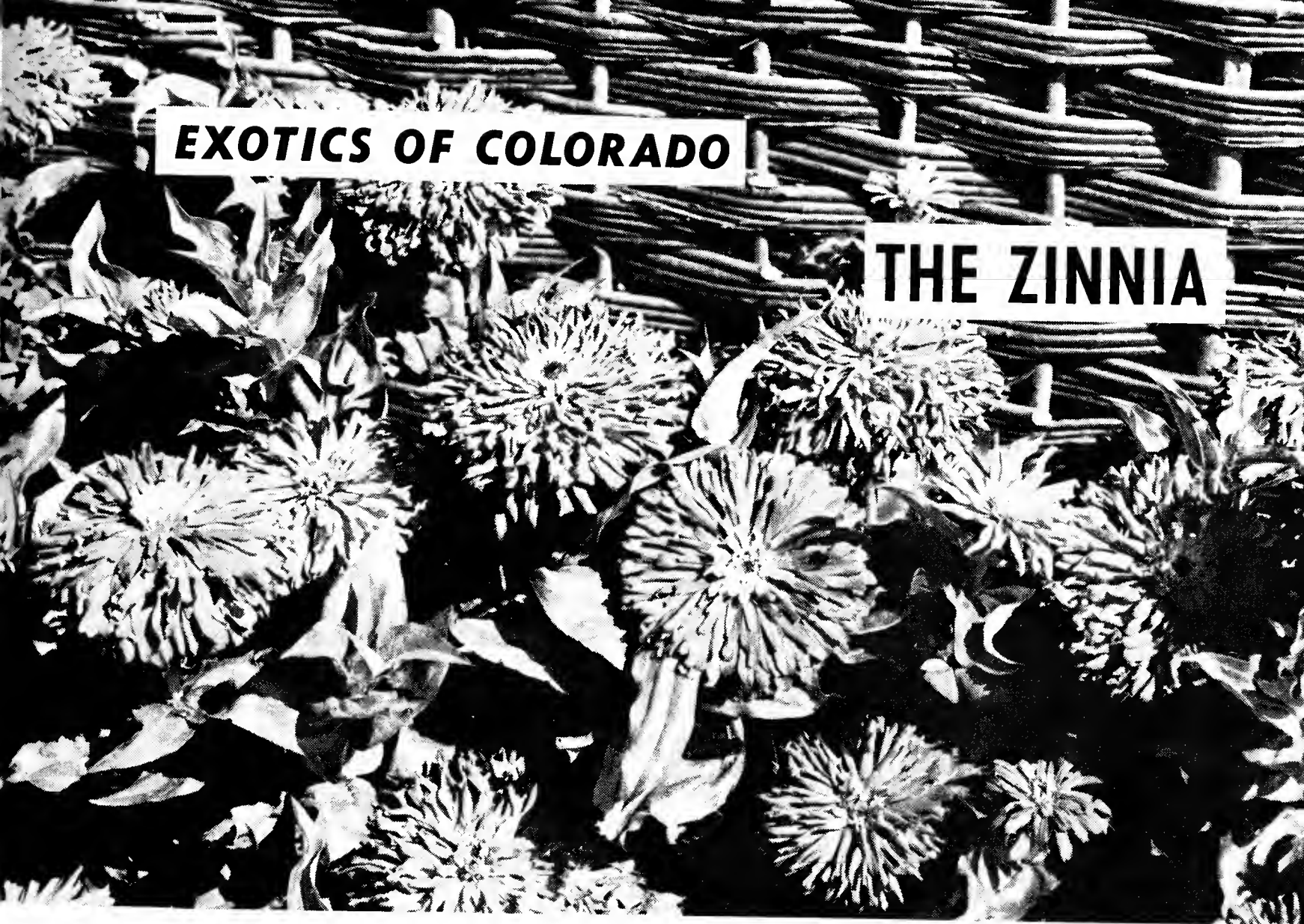


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HELEN MARSH ZEINER

ALMOST EVERY gardener uses the zinnia (*Zinnia elegans*). This cheery annual is now at its prime and will continue to bloom until blackened by frost.

There are myriads of zinnias — tall or short, large or small, single or double, cactus-flowered or dahlia-flowered, plain in color or striped, in a veritable rainbow of colors. Indeed, there are so many zinnias available for a few cents a packet that it is difficult to realize that they originated from a dull purple, single-flowered zinnia, certainly not very handsome by present standards, which was brought to this country from Mexico many years ago. In order to achieve today's variety from such a humble ancestor has taken many years of hard work by many plant breeders. This work of selection and crossing is still being actively carried on, for the

popularity of the zinnia means that new varieties are always in demand.

This year two new zinnias were of such quality that they won All-America Selections awards. One, Firecracker, received the Silver Medal. Firecracker is a tall plant with long-stemmed, cactus-flowered blooms as much as six inches across. As the name implies, they are bright scarlet red. The other award winner, Thumbelina, is a Gold Medal winner. In contrast to Firecracker, Thumbelina is extremely small for a zinnia. The compact plants grow to a height of about six inches. The flowers, in many colors, are borne for a long season.

Zinnias, coming from the dry, sunny parts of Mexico, are well-adapted to Colorado gardens. About the only complaint gardeners have is that the leaves mildew. This can be prevented

to a large extent if the gardener will avoid spraying the plants with water late in the day, so that the leaves are not wet during the night. Damp leaves at night encourage the growth of the fungus causing mildew.

Since there are so many different types of zinnias, they are a very useful group. They can serve as edging plants, bedding plants or tall background plants and they are often the backbone of the annual garden. Some persons complain that zinnias are too stiff to

be usable as cut flowers but with a little manipulation lovely arrangements can be made from zinnias. The smaller forms are particularly good for cutting.

Zinnias can also be dried or preserved in borax for use in winter arrangements. They hold their color very well.

Because of their ease of culture, zinnias are a good annual for the beginning gardener. They are a very rewarding plant. Few annuals give so much in return for so little.

Watch for the 1964 edition of the Denver Botanic Garden's Calender!

Lifting Plants in Autumn for Winter Bloom

MICHAEL ULASKI

PLANTS SHOULD be selected and prepared for winter well before frost arrives, since many of the best ones are harmed by cool weather. During the first few weeks indoors, much attention must be given to ventilation and syringing. Then, more than at other times, plants are particularly inclined to resent dry, close house air. Falling leaves and blossoms are signs of unfavorable reaction to such a change. A thorough drenching under a faucet will often check this condition.

Rest Period

All plants have growth cycles which include periods of rest. Just as trees lose their leaves in fall and enter into dormant periods, so do house plants

at some time rest in greater or lesser degree. All resting plants require less water and warmth than when they are actively growing. Do not feed plants during their rest period.

Light

All plants require light. Light is used by the plant in transferring certain substances into usable food. There are a number of foliage plants which need no direct sun but for most flowering plants, sunshine is a necessity. For example, without a maximum of sunlight, geraniums become spindly.

Temperature

A consistant coolness between 60 and 65 degrees F. in houses where

plants are grown is better than temperatures of 70 or 75 degrees F. Many of our decorative plants can be grown in a really cool window where the average temperature is 50 to 60 degrees F. Plants should be set back away from the glass if the weather is extremely cold outside. When plants develop weak, soft, spindly growth, foliage color is light and buds blast or fall prematurely, it is very often because they are suffering from too warm an atmosphere, often coupled with too little light.

Humidity

The greatest foe to indoor gardening is lack of humidity. Outdoors the air is relatively moist; indoors, with modern heating, it becomes very dry which sometimes causes parched foliage even if the soil has been moistened. A few make-shifts are helpful when no humidifying devices exist. A bucket or a pan of water set on your stove when you are cooking is good or if you have a floor furnace you can set a pot or a pan of water on it. The same can be done if you have radiators in your home. Another way is to have a tray filled with small pebbles and water with pots resting on the pebbles. This last is probably the best way of increasing humidity. These trays can be made to fit your window sill. Furthermore, cleanliness as well as humidity is increased if plants are sprayed with a bulb syringe or put under a shower or faucet from time to time.

Water

The question most often asked is how much or how often should house plants be watered. Only a general rule can be offered. When the topsoil feels dry to the touch, then is the time to water. Do it thoroughly so that the entire root system is saturated. In a little while, excess moisture will seep

out into the saucer, which should be emptied. In some instances you can water your plants by placing them in a water-filled saucer. In this way the moisture is absorbed from the bottom and the foliage will not get wet. African violets and cyclamen are among plants that need this type of watering. Rain water is better than faucet water. Water at room temperature is also better than cold water, which may have a retarding effect on growth.

Ventilation

A close atmosphere is very hard on house plants. They require some fresh air even when the weather is cold. If doors and windows are to be opened, be sure your plants are far enough away from the direct flow of cool air so as not to be in a draft. Air is essential to the roots as well as to the tops of plants. The surface soil can be kept loose by cultivating with a fork.

Food

Extra fertilizer is not as important as a soil with good texture and proper potting. Sickly plants are more likely to be suffering from too much heat and water rather than from starvation. Generally speaking, flowering plants require more nutrients than foliage ones, at least up to the time the buds show color. For slow growing plants, a light top dressing of complete fertilizer is good when directions are carefully followed. This does not mean that because a little is good for a plant, a lot will be better. Nor should a resting plant be pushed with any quick acting fertilizer. Thus the summer weary geranium requires coolness and time to rest rather than food.

Potting Soils

It is a matter of experience that plants try to accustom themselves to

any soil which is of proper texture. This is true even though there are almost as many soil formulas as there are types of house plants.

When potting newly rooted plants it is best to pot them in a loamy soil with a little leaf mold or peat moss added. (Do not use any commercial fertilizer in the potting mixture.) A good standard mixture for house plants consists of two parts good garden loam, one part leaf mold or peat moss and one part sharp sand. For general use, you can add one pint of bone meal and about two quarts of well-rotted cow manure to each bushel of the mixture.

A general practice is to pot flowering plants closely, that is, in pots that keep their roots restricted. A little root cramping tends to promote bloom.

Cuttings

In taking slips or cuttings from your old or favorite plants, you should take shoots or tops four to six inches long. These cuttings should consist of firm but not hard stem growth. Fill a pot with sandy soil and insert cuttings about one inch deep around the edge. Make holes with a stick and press soil around cuttings very firmly. Shade them from the sun and keep moist, not wet. When growth starts, pot singly in small two inch pots.

Among plants that can be brought into your home from the garden are begonias. Slips can be taken and placed in water. But, a preferable method is to use moist sand as a rooting medium. If water is used, add a few lumps of charcoal.

Cuttings of fuchsia can be taken from old plants in the spring. Fuchsias are not naturally winter bloomers. Winter is normally their resting period, although plants can be potted up and cut back so that it is possible to get cuttings in the spring.

Geranium cuttings should be four or five inches long with lower leaves removed and bases cut cleanly across, just beneath a joint. Plant firmly in a rather sandy soil in small pots. Keep shaded from direct sun and in a fairly moist condition at about 60 degrees F.

Coleus can be started from cuttings but are not A-1 house plants. They like full sunlight, cool temperatures (about 60 degrees F.) and careful protection from mealy bugs. They should be pinched back to prevent them from becoming too tall and spindly.

Asparagus or springer, as it is sometimes called, is used in pots or in hanging baskets. It can be started from seed very easily. Soak the seed for about 24 hours in warm water. Cover with sandy soil to a depth of one-fourth inch. Keep the soil moist and covered with paper until the seed germinates. A good temperature is 65 degrees F. Or you can pot up old plants and clean them up a little by cutting out some of the older growth to encourage the new.

Petunias are sometimes grown from cuttings. The double ones will make nice plants for spring bloom. Keep them on the dry and cool side throughout the winter.

Then there are hanging baskets which you may want to bring inside. If this is the case, it would be a good idea to clean them up before doing so, for they probably received little care while outside. Pinch back plants that need it, spray for insects, then syringe with water and give a light feeding of fertilizer before the baskets are brought in.

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Narcissi = My Favorite Flowers

LUISE L. EWENS

THE NARCISSI, known as daffodils by the English, are my favorite flowers for many reasons. Here are a few:

Daffodils bloom early, just when we are so anxious for signs of spring. Being quite weather resistant they can take our spring rains and snows.

They are useful in landscaping for naturalizing in woodlands and around shrubbery. They are appropriate as border plants, in clumps and many varieties adapt to rock garden culture. For indoor bloom, plant daffodils in pots in early fall. Bury the pots outdoors or place in a cool basement. Early in December bring them into the light and you will soon have flowers. Certain varieties can be grown indoors in water by anchoring the bulbs with pebbles or sand.

Wonderful cut flowers, daffodils are easy to arrange, especially with early blossoms of flowering shrubs and trees. The bulbs are inexpensive, currently priced at 20 cents to a dollar each.

Daffodils come in a great many varieties, such as yellows, whites, bicolors, even pinks; some with trum-

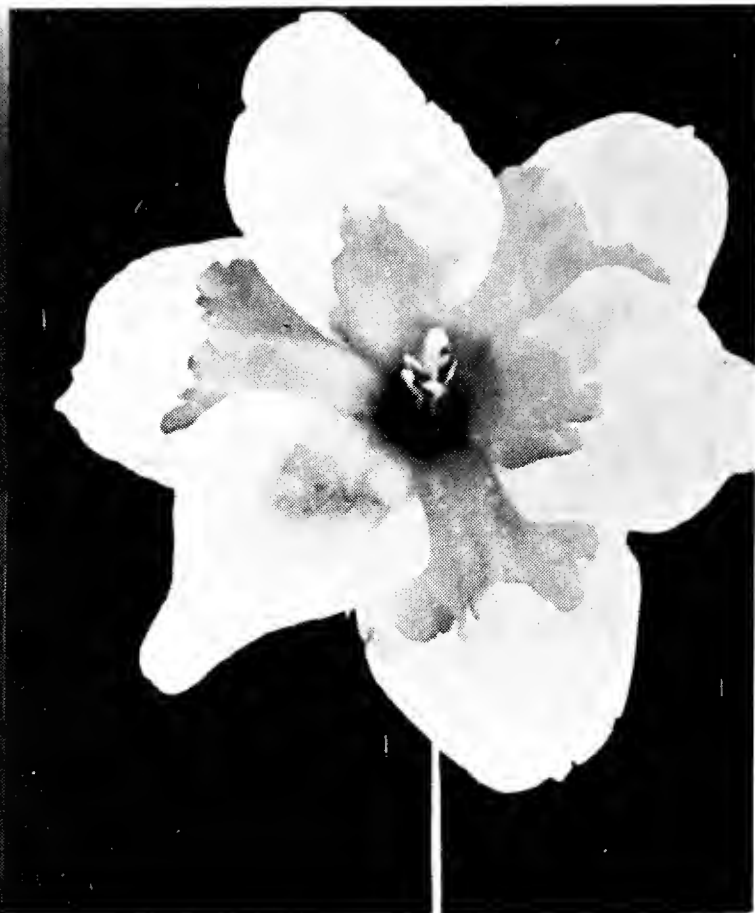


Photo Courtesy of The Bulb Growers of Holland

pets, large cups, small cups and doubles. Some of the cups are frilled; some are edged with orange, red or green. They are tall, medium and short. Some have one bloom to a stem; others in clusters of two or three and some are bunch-flowered. A few are quite fragrant.

By carefully selecting varieties the daffodil season may extend from March until mid-May. Among the first to bloom are the long trumpeted varieties such as Ben Hur, Fortune, King Alfred, Unsurpassable, Zest. Next come Bodilly, Dick Wellband, Duke of Windsor, Hugh Poate, John Evelyn, Market Merry, Meadow Lark, Selma Lagerlof and Scarlet Leader.

Then the whites, Beersheba, Mount



Park's Exclusive De Mol "Orchid" Daffodils

Artist

Elizabeth Bass, Mol's Hobby

Estella De Mol

Hood, President Lebrun, begin to open.

Trailing these we have Dervish, Dunkel, Lebanon, Narvik and Thalia (rather short with clusters of perfect white flowers). Mrs. R. O. Backhouse, one of the first pinks introduced, is a little later but should bloom next. Among the late ones are Dreamlight, Indian Summer and Wild Rose.

Twink is an early double. Others are Cheerfulness, Mary Copeland and Irene Copeland.

Consider, too, the species and smaller varieties often referred to as jonquils. Some interesting ones are Bobby Soxer, Orange Queen, Trevithian, jonquilla and bulbucodium conspicuus (hoop petticoat). These are very appropriate for a rock garden.

The above named varieties are only a few of the many hundred available. Possibilities for next spring's garden are unlimited.

Daffodils, hardy and usually very prolific, are of easy culture. Plant bulbs

about five to six inches deep between August 15th and September 15th to give them time to become established. In the spring cultivate, fertilize and water, if necessary. DO NOT cut the foliage after flowering. If it is unsightly double it back and bind with raffia or rubber band until it turns yellow.

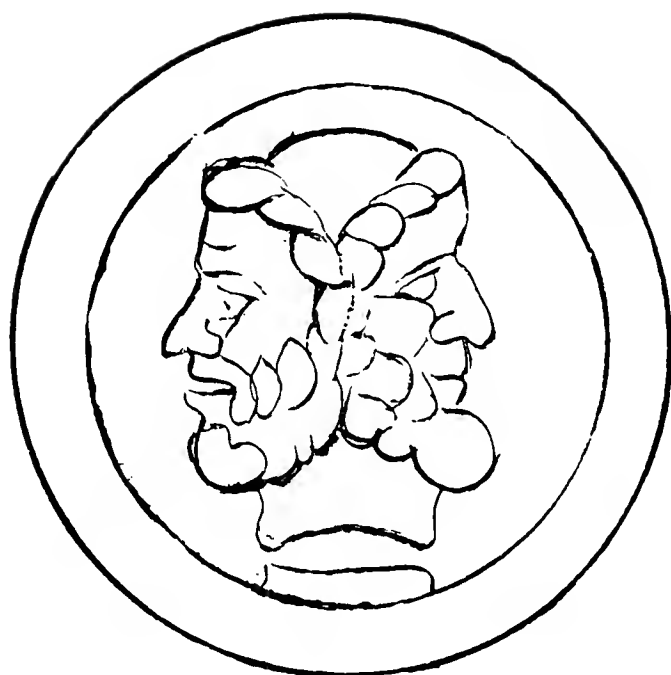
Daffodils may be transplanted any time. Replant immediately if the leaves are green. If bulbs are ripe store them in a cool place until time to plant. Do not divide annually, every four to six years is often enough.

Few diseases attack daffodil bulbs in this area. Eelworms or nematodes and bulb flies might attack. If found, destroy the bulb and disinfect the soil. Since the average bulb is inexpensive the grower will save a great deal of time, money and future trouble by doing so.

Plan now for spring daffodils unlimited!

LOOK *Both Ways*

MARGARET E. EASTON



AUGUST OUGHT to be the January of the gardener's year. Certainly there is no more rewarding time for you to look both ways at once in the fashion of Janus, the Roman god of gates for whom our first month is traditionally named. Let the rest of the world celebrate the new year in January while we adopt August 1st as our date for resolutions and planning a new year.

Why is August such a perfect month to start a gardening year? You might answer: "Because it is time to order spring bulbs and to transplant and divide perennials for next summer's bloom." But you would be only partly right. Janus wore two faces. What better time than now to look backward at how your garden fared this year while the details are fresh in your mind.

This month there is some leisure in the well-planned garden for just the type of introspective thinking needed to insure a more successful effort next year. Your annuals should be taking over in a gay blaze of color about now and the dahlias and chrysanthemums are getting ready for their big show. This is the time, then, to sit in the shade near your garden, sip a cool drink and dream big plans for next year. Decide, right now in August,

what new bulbs you want and then get that order in so your bulb planting can be done before cold weather sets in. A sketch pad helps immensely in this task. It will aid your planning and serve as a reminder of what you want to achieve when the bulbs arrive. I liked the suggested idea from a recent Garden Clinic of using colored pencils to work out your color effect.

Spring-blooming perennials should be planted this month if they are to get their roots established before frost. It did snow, remember, September 1st last year. This may mean more ordering or a dividing job among the pinks, the early phlox, Shasta daisies—everything, in fact, which has already bloomed and needs dividing to stay thrifty and healthy.

If you want more of some early perennial, now is the best time to divide your plants into smaller pieces. Lots of watering between August and frost will help to give you many fair-sized, established plants from each little division.

We were going to gaze backward, too, weren't we? Free yourself for a few days from weeding and chores in the garden and take time to really look about you. Not just from one angle. Give yourself a chance to see your

yard as your neighbors see it — from the street, across the street. I have done this and it is surprising — even a bit of a shock. You may have provided a lovely view for some of your neighbors while others view it from a less than pleasing perspective. Such mundane articles as compost piles, garbage cans and trash heaps may need veiling. Seen from another angle, your garden may suggest its own improvements.

Stroll slowly past the borders. They have needs that are most apparent at this halfway point in the growing season. I do not suggest you neglect anything that shrieks to be done — such as spraying for aphids on the chrysanthemums, for instance. Try just once to overlook details and see your garden as a whole. What plants were missing this spring? What needs replaced? What has failed to live up to your expectations?

While leisurely sipping that second cup of coffee one morning at breakfast on the patio we commented that our rock garden this year was the prettiest it has ever been. The rocks have a lot of purple tones in them which are accentuated by the Sugar Plum petunias I planted there this year and which are blooming profusely. The blue of a few “love-in-a-mist” which have migrated there enhances the lavender and purple of the petunias — a color combination I’m fond of. So this fall I’ll scatter seeds from the “love-in-a-mist” and have a profusion of Sugar Plum petunias for a summer color display. I missed my white petunias and white cosmos. (I love white, especially in the moonlight.) Also, I don’t have enough of the golds and yellows which I like when planted against a redwood fence. Drink your third cup of coffee and ask yourself the questions: “What was missing, what do you need and what

didn’t meet your expectations?” (You’d think all I did was sit in the garden and drink coffee!)

Janus was only a minor god with one face looking backward, another forward. You can top him since you are also living in the present. So cherish a few August moments by enjoying the present — forget what the garden was or will be. Smell and taste and feel and see what it is right this minute.

How long since you’ve put your nose to a lily, a rose, or crushed a lemon mint leaf and smelled the fresh pungent aroma, or eaten a ripe tomato from the vine? We also neglect our sense of touch. Touch the velvet faces of pansies, the furry leaves of the mullein rosettes, the smoothness of a choice piece of driftwood which has been rubbed to a satiny finish with waxed paper.

All gardeners look, but do they see? Amidst the play of color, form and shadow in the garden, so many other things are happening. While sitting quietly in your August garden you might see a pair of birds pecking at an apple and the butterflies sipping nectar from a flower. I never fail to be thrilled by the sight of the evening primroses unfolding and opening at dusk and to smell their spicy aroma. Actually, looking forward and backward as well as at the here-and-now need not be limited to August; it’s just that there seems to be more time for such pursuits. Soon enough, comes the time when the reverie, the dream and the planning must be translated into action, always toward the end that your garden will be more beautiful, more satisfying. We have looked backward to see what was missing; we have enjoyed the delight of the moment; now we must begin another gardening year with our eyes on the seasons to come and the gardens they will bring.

Continuous

ROSE SUDMEIER

BORDERS

IT REQUIRES considerable armchair planning to work out color combinations and to insure a garden full of color from spring until fall. A plan, drawn to fit your site and location, is necessary. This plan can also serve as a record of what has been planted, time of bloom, color and height. Your garden will never become monotonous if you plan carefully and select the right plants.

FIGURE I: This planting shows a color harmony of lavender and pink and ranges from deep purple and rose to lighter and more delicate shades. All of these plants were selected to harmonize in color and to bloom at the same time. The early blooming plants are followed by others whose colors correspond with the original scheme.

The border of this planting is a lavender creeping phlox which is planted 12 inches apart. Working the soil around these plants keeps out slugs which seem to like dense, undisturbed borders. To me, this way is more attractive for each clump stands out like a little bouquet. In my opinion, phlox should be planted in every perennial garden. Their beautiful shades of pink and lavender blend in wonderfully and

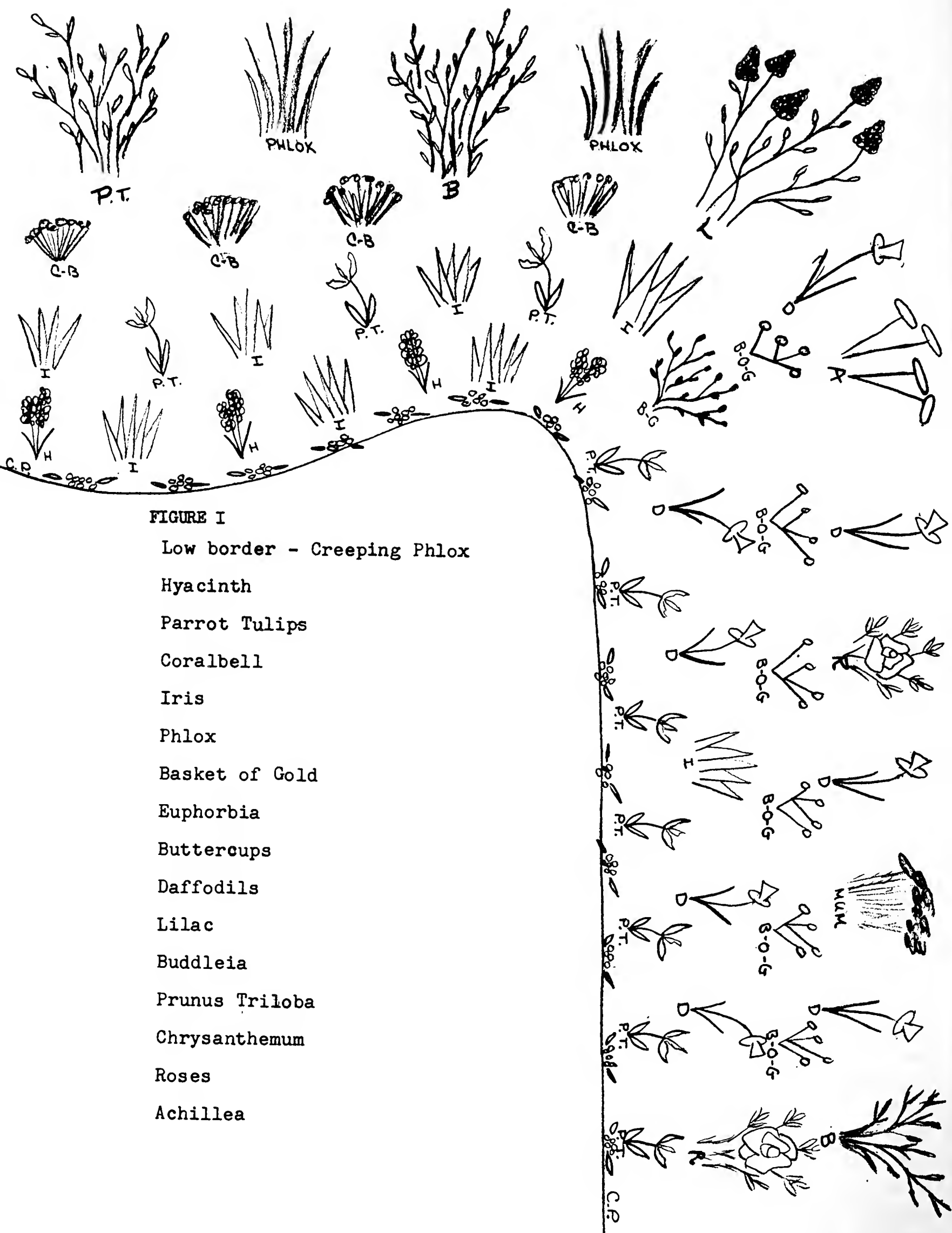
make a good showing for a long time.

Next to the phlox are grape hyacinths, in alternating colors of lavender and pink. Right behind these are the parrot tulips, Violet Queen and Fantasy. Both the grape hyacinths and parrot tulips are replaced, following their bloom, by an annual of some kind. A semidouble petunia is a good selection as they will continue to bloom until frost.

Along the east side of this planting, the color scheme changes to gold except for the low border of phlox. It consists of daffodils, basket-of-gold, euphorbia, buttercups and a full row of Texas Gold (a parrot tulip). Later, they are followed by yellow iris, floribunda roses, achillea and yellow chrysanthemums. It is truly a delightful spot!

FIGURE II: Here I have a low, continuous border of a small, pink blossomed sedum which I have had for more than 15 years. It must be reset every two years or it becomes too matted. Slugs do not seem to like this particular variety for I have had little trouble.

Behind the sedum I have a spaced row of grape hyacinths. Next, a row of



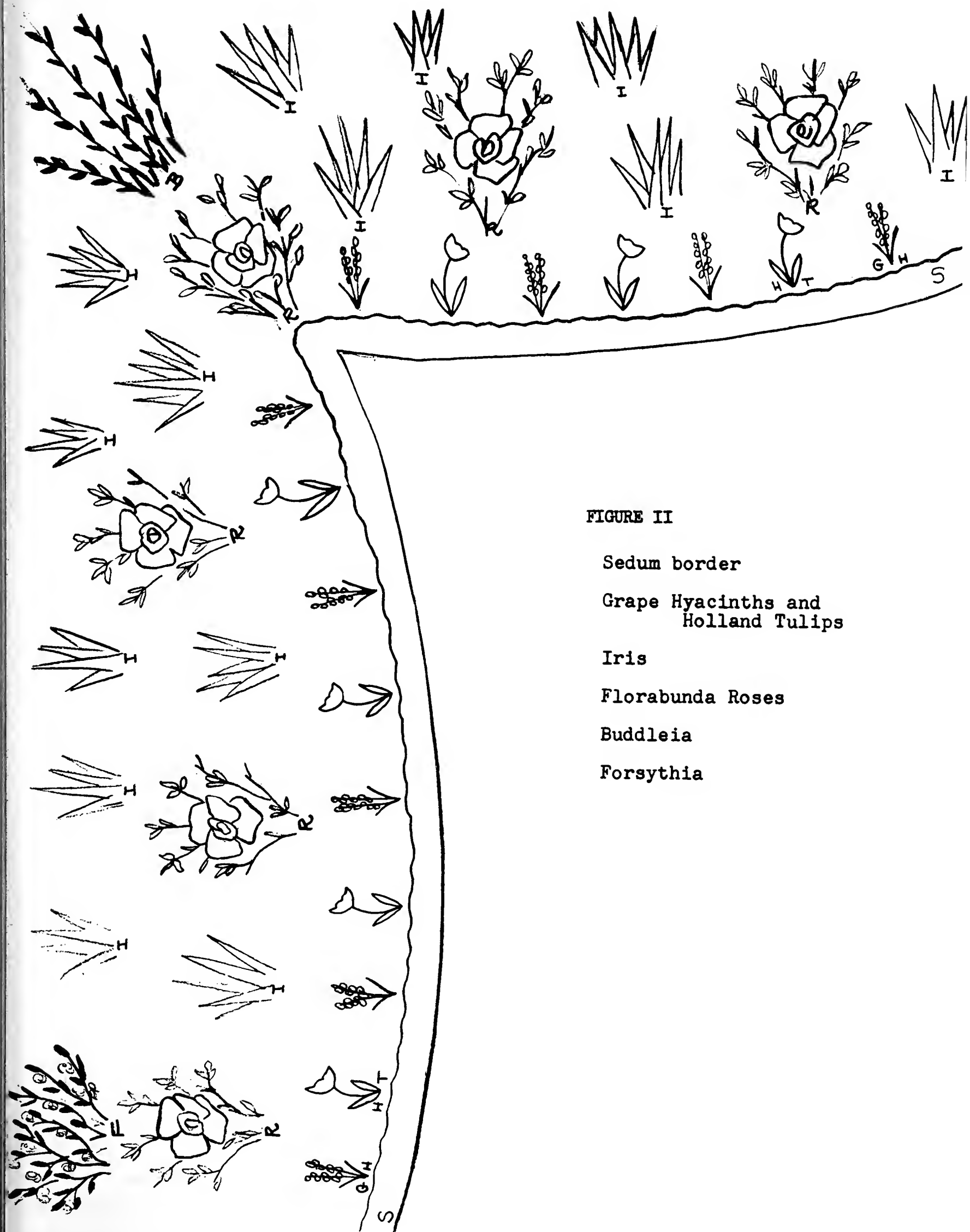


FIGURE II

Sedum border

Grape Hyacinths and
Holland Tulips

Iris

Florabunda Roses

Buddleia

Forsythia

Holland tulips, which are planted in groups whose colors correspond. Each group is of the same color and was selected so it is complementary to its location. The same idea is followed throughout the summer by the use of floribunda roses, carefully planted as to height and color.

Most of my iris are planted in this section of the garden, intermixed with red Japanese poppies that bloom at the same time. They make the most striking and colorful display of the entire season.

Scattered throughout the rest of this section are plants of all kinds and colors that bloom at different times, such as oriental poppies, lupine, Shasta daisies, chrysanthemums and others. In each corner there is a tall, purple buddleia. In front of these buddleias I have planted a pink floribunda rose. Both bloom from early summer until frost and correspond with my complementary color scheme.

The following represents a partial list of annuals and perennials that I have found excel as border plants. From this list, one can select those plants that will blend in with any background.

Perennial Border Plants

All of the sedums make excellent low borders. A new variety is Indian Chief. In the early fall, this lovely plant produces flower clusters of an unusual coppery shade and has attractive gray-green foliage. They are upright plants about 12 inches in height.

Alyssum or hardy candytuft makes a delightful companion for the early flowering bulbs and the iris. All the varieties, including Gold Dust (a golden yellow), make attractive low borders that bloom profusely over a long period of time.

Anemone is a charming perennial

flowering plant and very suitable for use in borders. The Japanese anemone, which is 15 inches high, is my favorite. Anemones grow wild in many countries. The pasque flower anemone, a native of Great Britain, is one of the loveliest. It has finely cut leaves, grows ten inches high and bears large, purple flowers in March.



Park's Coleus Chartreuse

We do not want to overlook the beauty and possibilities of a lily garden. The stately regal and madonna lilies, in glistening white, make an interesting section with other colors. White splashes, such as this, are needed in our gardens, but, an entire white section or border is not appealing to most gardeners. Among lilies, one can find different varieties that will bloom from June well into September. Hardly any other plant adds more interest and beauty to a landscape effect than a full border of lilies.

If you like warm colors, all the

shades of yellow through orange and red, then day lilies are for you. Their rich colors fairly glow in the garden for a long time. They are disease resistant and grow in almost any soil and exposure.

The blue anchusa when interplanted with the old, lemon day lily, makes a very lovely planting. It is also beautiful with pink or crimson peonies. The new anchusa, Loddin Royalist, a vibrant purple-blue, makes a beautiful background.

Day lily and lupine combinations cannot be overlooked. The lupine produces flower spikes of outstanding form and color. Masses of these beautiful flowers, on heavy stems and in a variety of colors, are most attractive.

Lythrum, with its deep pink florets on dozens of spikes, works in well with most borders and has a long blooming season.

One of the loveliest of all the blue perennials is delphinium. The blue belladonna has an exceptionally rich, blue color and graceful habit. It is gorgeous with white lilies and is highly recommended.

The many colored, full-flowered spikes of the giant hybrid delphinium make it stand out in an early summer border. From soft blue and heliotrope to deeper shades, it makes a striking display with pink roses or other rosy plants. Gold Plate achillea is a good companion with the deeper blue varieties.

Delphiniums or other tall plants of exceptional beauty can be used as accent plants. Repeating them several times, at intervals, in a long border is preferable to planting them in a solid row.

Annual Border Plants

In this list, I think the petunia stands out as the most widely used of the annuals. With its endless variety and

color it cannot be surpassed. I feel that it adds more life and color to a garden than any other plant. Every year I contemplate a change for my annual border and flower bed. I always end up with petunias and never regret it for they give me endless pleasure throughout the season.

Ageratum has a delicate blue flower and is a free bloomer, as is lobelia. Annual phlox always makes an outstanding low border as does sweet William and verbenas. Because of their color and beauty, they deserve a place in any garden.

Dianthus (pink) includes many types of single, double, frilled and edged varieties. They come in various shades and have a delightful, spicy fragrance.

Most gardens include marigolds for they come in a wide range of heights and colors. Cupid marigold is an odorless, dwarf plant with chrysanthemum-like flowers. It is a new variety and would make a lovely addition to the garden.



Photo Courtesy of Bodger Seeds, Ltd.

The old stand-by zinnia should be given a place in every garden. The variety to choose from is noteworthy. They range in size from the giant, dahlia-flowered down to Tiny Tim which is about ten inches high.

Tall cosmos and dahlias are still found in many gardens. They make an outstanding background for lower borders.

With the large variety of flowers and combinations we must finally choose our own favorite plants. Then, we can proceed with a plan best adapt-

ed to our own garden. After years of gardening by this method, I still dig up and move plants every year. This is the joy that makes gardening more interesting — to ever improve but never to finish.

To those of you who are becoming interested in continuous borders, I will say they require additional time in planning, planting and care. The rewarding satisfaction and continued pleasure you receive for many years to come, compensates for the extra time devoted.



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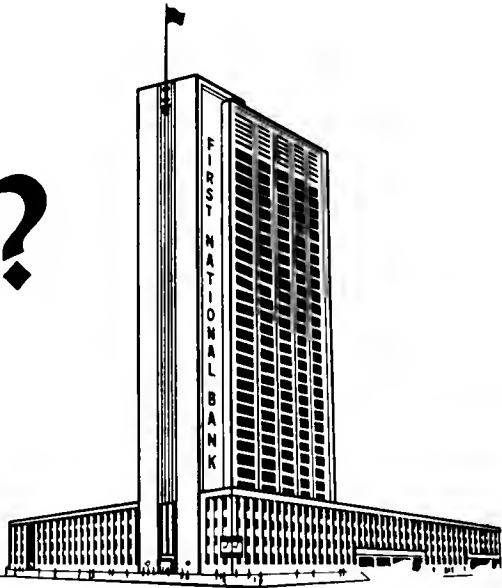
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Some Notes

On The Fall Planting Of

EVERGREENS

FRANCES NOVITT

ONCE AGAIN the subject of fall planting arises. The following notes are based on an informal survey on the fall planting of evergreens. A number of plant experts, landscape architects and nurserymen were consulted. In some cases their observations were generally in agreement. In other cases their experiences with certain evergreen varieties have resulted in differing opinions.

The Problems

Let us review the general problems concerning fall planting. Most of them are due to our climate. Our winters are generally dry, with violent changes in temperature. They are characterized by long periods with no snow, warm days and freezing nights, periods of extreme subzero cold and drying winds.

Home owners are inclined to forget about the plants in their gardens once the hoses are drained and put away for the winter. In our Denver city parks when automatic sprinkling systems are drained in the fall almost no artificial watering can be done until the systems are turned on again the following spring.

How do these conditions effect the

evergreens in our parks and around our homes? They have not shed their leaves and gone into dormancy like all deciduous plants. Although evergreens are not actively growing in the late fall and winter, moisture continues to transpire from the surface of the foliage all year. Therefore, it is necessary that the roots supply moisture and oxygen from the soil throughout the winter as well as the summer. Winter winds often dry out the foliage faster than roots can supply moisture to it. Winds also cause newly planted trees to sway, unless they are properly guyed, so that the roots lose contact with the soil. It often happens that we suddenly will have warm, even hot, days while the ground is still frozen, so that the roots are unable to take up moisture from the soil. Furthermore, newly planted evergreens have had a fairly large percentage of their root system cut away in the moving and there has been only a little time for the growth of new roots before winter comes.

There is no doubt that spring is the ideal planting time. The cool weather, spring snow and rain and the imminent

growing season all help newly planted material to get established. Active growth can begin immediately; new roots soon begin to replace those cut away and to send food and moisture to the buds to start vigorous new growth.

However, to relieve some of the tremendous pressure of work in the short spring season, some nurserymen do promote fall planting. If they guarantee the material the homeowner has nothing much to lose except time if a plant dies. A new addition to a home, new building construction or other good reasons, may make it necessary to transplant evergreens which the arborist or nurseryman feels would be better moved in late winter or spring. He may move the plants with oversized balls of earth to reduce the risk of loss.

The Best Time

Fall planting of evergreens begins when most evergreen varieties enter into semidormancy. This occurs with the arrival of cooler weather, when daytime temperatures stay below 70 or 75 degrees F. It continues into cold weather when the ground becomes frozen and impossible to dig. It is said that as soon as the summer growth has hardened, the buds for the next year are fully formed and the weather has turned cool, fall evergreen planting can begin. In general, the sooner it is done the better, for some root growth will take place during the warm days until deep frost arrives. Actual dates for fall planting depend on the weather, possibly beginning about mid-September and lasting until mid-December. Winter planting begins when deep frost settles in the ground. Depending also on the weather, this usually occurs in about mid-December and lasts to about mid-February. After this, much deciduous material is planted bare root and spring planting gets under way.

What Can Be Planted In The Fall?

Large trees, both deciduous and evergreen, which require large balls of earth, must necessarily be moved in the winter after the ground freezes. Frost is the tree planter's friend at this time, because it hardens the big earth balls, so that even sandy soil is firm and big trees can be transported and reset with little danger of the ball cracking or breaking and damaging the roots.

In the Denver city park system a



large amount of planting is done in winter. After new tree locations are staked in the fall, a six inch thick mulch of leaves is spread around the stake, covering the area where the hole will be dug. Trees to be moved are similarly mulched. When the time comes, these mulched areas will not be frozen, the holes can be dug, the trees can be dug and balled and exposure to the freezing air overnight will harden the ball enough to move it safely.

However, container-grown plant material, whether deciduous or evergreen, being small and having a complete root system, can be planted almost any time. Fall is alright for planting this material, provided it is given careful attention during winter.

As for other evergreens, which are neither very large trees nor container-grown, a guide for fall planting might be to move only those varieties which have proved to be the most tolerant. There is considerable variation in the opinions of the people who were consulted, as to which varieties can be moved successfully in the fall and which can not.

Let us mention first some varieties of trees under a height of ten feet. Most people were in agreement that blue spruce, under ten feet in height, are tolerant of fall moving. They are considered to have completed their active growth by late summer and some nurserymen move them after about mid-August, if the weather is cool. Pinion pines are considered to be very easy to move and are suitable for fall planting. Opinions are divided on other varieties of pines. Some people felt that most pines will tolerate fall planting and others did not. It was mentioned that lodgepole pines are difficult to move except in small sizes and should be planted in the spring. Those who do plant most varieties of pines in the fall say that they finish their active growth when the blue spruces do but should not be moved until after mid-September because their roots are less fibrous than those of spruces, are more fleshy and slower to start growing again.

Some nurserymen, through their own experience, have developed more limiting dates for planting certain varieties of larger evergreen trees. They prefer to move blue spruce over ten feet in height from mid-October to early No-

vember, after the trees have been thoroughly pre-watered, so that the plant tissues are well hydrated. Sometimes the trees are sprayed with a wilt-proofing material to reduce evaporation. They prefer to move large pines and large upright junipers after early February, that is to say, in early spring. Opinions vary regarding the fall planting of Douglas fir, more people agreed that silver fir can be moved more safely in the spring.

Many said that fall is a poor time to move upright junipers. Although *Juniperus scopulorum* is fairly rugged they did not recommend fall planting it. The varieties of *J. virginiana*, such as *canadensis*, Dundee, Hill Spire and also *J. chinensis keteleeri*, among others, have proved difficult to move and most recommended them definitely for spring planting. Most said the *J. monosperma* moves better in late winter or spring. It was mentioned that junipers are perhaps not dormant to the same extent as spruces and pines and that the thick foliage loses more moisture by evaporation.

For the purposes of this article, the category of evergreen shrubs, not container-grown, would include field-grown nursery material and plants already in gardens or grounds, which must be relocated. These might be larger than container grown stock. Most people felt that the more common spreading junipers generally do move well in the fall, although there was some doubt expressed about tamarisk junipers, the varieties of *Juniperus horizontalis* and mugho pines. Most field-grown, broad-leaved evergreens, they felt, should be moved in the spring.

Maintenance Of Fall Planted Evergreens

Any fall planted material, evergreen or deciduous, container-grown, balled and burlapped and even perennials

moved with a clump of earth, requires careful attention during the following winter.

Field-grown plants should have been well pre-watered before they were dug. This should have been done long enough before the actual moving so that the earth is not too wet but still moist. At the time of planting they should have been thoroughly watered-in, by allowing water from a hose to seep slowly upward from the bottom of the hole. This is not done primarily to soak the ball but to drive out air pockets from the backfilled soil and pack it around the roots. At the time of planting, all trees should have been made very stable and steady by the use of guy wires so that after the planting was finished the trees could not sway. As pointed out before, swaying causes the roots to break contact with the soil around them, causing air pockets and damage or death to the roots.

A mulch spread over the area around the base of the plant would be highly

beneficial. This conserves soil moisture and prevents freezing so that roots can take up the moisture. Around fairly large trees a mulch can be up to six inches deep and spread out so it is a foot wider all around than the filled hole. It is best pulled a few inches away from the trunk or very low branches, so that mice will not burrow through the mulch and chew the bark during the winter. It can be composed of such things as leaves, straw or wood chips. Around smaller plants the spread can be reduced in proportion.

If all these things have been done, the owner of the evergreens need only pull back a part of the mulch about once a month during an average dry winter, to check soil moisture. If it is dry it should be thoroughly and slowly soaked and the mulch replaced. It probably should be mentioned that one should not go to the other extreme and apply so much water that the soil is waterlogged, leaving no space for necessary oxygen and creating mud.

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after approval of the proposal by the Botanical Garden, formed a fund-raising committee, known as the National Committee for the Wildflowers of the United States.

With nearly a half million dollars already raised by this group, it was possible last week to begin preparation of the first volume, on the wild flowers of the northeastern states.

Dr. William C. Steere, director of the New York Botanical Garden, was named general editor. Serving with him, as senior botanist and charged with the greater part of the writing, collecting of photographs and line drawings as well as overseeing such explor-

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ations as remain necessary, will be Dr. Harold W. Rickett. He is a New York Botanical Garden botanist and author widely known for his skill in accurately and understandably translating scientific language and concepts for the layman. His writings also include several books on wild flowers.

Each of the five volumes will describe and illustrate 1,500-3,500 plant species. Most will be shown in color photographs of such fidelity of hue and sharpness of detail to qualify as plant portraits. Line drawings, used particularly for their clarity in distinguishing look-alike species, will illustrate the remainder.

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plorations experience, its best-of-their-kind library and herbarium and its long history in publications, particularly of plant manuals.

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little-known ORNAMENTALS from the Land of the Rockies

M. WALTER PESMAN

Reprinted from "Advances in Horticultural
Science and Their Applications" Volume III

Many ecologists divide the area below (or south of) the Subalpine Zone into two separate units, the Montane Zone around 9,000 ft. (2,700 m.) above sea level in Colorado and the Foothills Zone between it and the Plains region. There is no sharp delineation between the two and for the sake of simplicity we shall treat the two as one unit. It is an area of solid forests in the higher regions, thinning out, lower down, into a mixture of ponderosa pine, many shrubs and some grassland. Many worthwhile shrubs for the home garden may be obtained from this Montane-Foothills Zone.

A few of them have already been introduced in European gardens, such as *Rubus deliciosus*, which I insist on calling western thimbleberry, though dubbed boulder raspberry by *Standardized Plant Names*. It is graceful, easily grown, hardy and has large white rose-like blooms.

Equally striking is *Robinia neomexicana*, the pink-flowering shrub locust, easily propagated from underground stems or seed, inclined to spread out of bounds but quite good-looking.

One of my favorites is *Physocarpus monogynus*, a low ninebark, with all the good qualities of ninebarks in general and seldom getting too tall; its fall color is beautiful.

The following two shrubs are more difficult; they grow naturally in rocky ground, often following the cracks between stones. These are *Jamesia americana*, cliff waxflower, closely related to the mockorange, with white, waxy blossoms and *Holodiscus dumosus*, rock spirea, with clusters of delicate creamy-white blossoms and good foliage. Eventually some plant-breeder is going to evolve a pink variety; there is a definite pinkish tinge in some specimens.

Two buffaloberries are native in the region, the taller *Shepherdia argentea*,

of the plains, with edible fruit and *Shepherdia canadensis*, much lower, thornless, growing on moist, shady slopes; fruits good-looking but quite inedible.

A fine-textured low shrub, *Ceanothus fendleri*, goes by the name of New Jersey tea; it is slightly thorny and when in bloom is covered with clusters of small white blossoms. It is the sort of shrub that might enhance a rock garden.

Another smallish shrub, blooming in the early spring with small yellow, inconspicuous but fragrant flowers, may be used in a dry rocky place with little water. It is *Purshia tridentata*.

Similarly in arid spots we can use a larger greyish shrub, *Cercocarpus montanus*, conspicuous for its spiral-tailed fruit in great quantities, which gives it the name of featherbush (mountain mahogany).

This list would be quite incomplete if it did not mention one of the most dominant grey shrubs in the Rockies and immediate neighborhood, the big sagebrush, *Artemisia tridentata* and its derivatives. It covers acres and acres of territory, creating the grey landscape and — after a rain — perfuming the atmosphere. Its use in European gardens would be quite limited, I am sure.

Somewhat more desirable would be another dominant shrub of foothills and plains, the rabbitbrush, *Chrysothamnus*, in its many species. When in bloom in fall, it is very spectacular, covered with yellow. It is a typical dry-land shrub.

A number of the shrubs just mentioned, if grown in humid zones with high precipitation and in an acid soil, would have to change their normal habits considerably. Many of them show their character in their appearance; grey instead of lush-green is common in arid country, texture is apt to be fine, growth slow and stocky.

Such plants, in order to do well at all in the traditional flower border, must be given special location and special treatment — not always an easy thing to do.

Some of our quite attractive shrubs grow only in selective environment. If cultivated their adaptability would be put to a severe test. Such are, for instance, the following:

Peraphyllum ramosissimum is a lowish shrub called squaw apple. Its flowers look like apple blossoms, its fruit like tiny crabapples, attractively colored yellow and red. But no self-respecting squaw could possibly eat these horrible-tasting squaw apples. The plant would be a valuable addition to any garden if it could be coaxed to live.

Fendlera rupicola naturally grows in the same environment; it is and looks like a close relative of the mockorange: upright growth and four-parted flowers, white or pinkish, much worthwhile.

Normally farther south in the arid foothills we find *Cowania mexicana* (cliffrose) with yellow blossoms and *Fallugia paradoxa*, Apacheplume, with white flowers. Both belong to the rose family, have small, finely divided leaves and clusters of feathery-tailed fruit. Yes, they do have that "arid" look.

A highly attractive low shrub of the rose family is appropriately called tansybush or desertsweet (*Chamaebatiaria millefolium*). It grows on both rims of the Grand Canyon together with sagebrush and pinyon pine. Its numerous white flowers, fern-like foliage and reddish stems make a beautiful contrast.

By this time I have, I am afraid, left the impression that many of these foothill plants of arid America are beautiful and desirable but "... don't have too high expectations in a humid climate!" The warning is partly justified, I feel.

To leave a better taste then, let me hasten to add some others that have better chances. There are, for instance, a number of *Crataegus* and *Prunus* species that are most attractive and not difficult. There is a low type of *Rhus glabra* that has a glorious fall color. The golden currant, *Ribes aureum* or *longiflorum*, is already introduced, with fragrant blossoms and edible fruit. Its near relative, *Ribes cereum*, is often called squaw currant, with the idea that its insipid fruit is good enough for squaws only. It has pretty pink blossoms that may make it a good item for rock gardens of dry land.

Particularly good possibilities have *Symphoricarpos oreophilus*, mountain snowberry, a low neat shrub with beautiful pink blossoms and *Salix irrorata*, the bluestem willow, much more dainty than the regular pussy willow and having black and yellow bud-scales, most attractive!

Alder, birch and maple come in shrub form (*Alnus tenuifolia*, *Betula occidentalis*, *Betula glandulosa* and *Acer glabrum*). They give character to shrub borders and should not be too difficult.

To me it seems that our golden aspen, *Populus tremuloides aurea*, is much superior to the European *Populus tremula* but I may be prejudiced! Certainly, the moderate-sized *Pinus cembroides edulis* has a place in the home garden, even if it might not produce its delicious pinyon nuts in a non-arid country. Among perennials, *Calochortus*, *Penstemon* and *Eustoma russellianum* should be widely grown.

The Plains region of the "Land of the Rockies" does not have to offer too many plants to the western garden. Highly alkaline soil is required for the interesting *Sarcobatus vermiculatus* with its fleshy leaves.

"Ah, eet ees *Yucca*, *Yucca angustifolia*." This was the exclamation from Monsieur Henri Correvon, the Swiss expert on alpine, when we had the pleasure — a number of years ago — of showing him around in our Colorado mountains. We now call it *Yucca glauca* but by any name it is just as lovely! Any yuccas would be a worthwhile addition to any garden, with their needle-like leaves and bellshaped, waxy blossoms. Sad to say, unless given special care and soil, they may fail to come up to their masculine beauty.

Certainly a highly decorative addition to the perennial flower border is one of the *Mentzelia*, known as evening star flowers or blazingstar. Our most spectacular ones are *Mentzelia nuda* and *Mentzelia decapetala*; the latter is breath-taking when its large waxy flowers open up in the evening, spreading fragrance in the air. It is, however, particular in wanting heavy clay soil derived from shale.

Prickly poppy, *Argemone intermedia*, has thistle-like, glaucous leaves, yellow sap and large delicate white poppies that do not seem to "go" with that type of foliage. It must have plenty of sunshine and grows naturally in open plains.

Equally typical of the arid plains is *Asclepias speciosa*, the pink showy milkweed with thick leathery leaves, white milky sap and decorative in its flower clusters as well as in its opening seed-pod with silky seed popping out.

So many perennials or biennials vie for attention in the arid plains it is hard to make a choice. Evening primroses (*Oenothera*) come in white and yellow, upright and stemless; prairie snowball (*Abronia fragrans*) blooms in late summer; sandlily (*Leucocrinum montanum*) in early spring. Bush morning glory (*Ipomoea leptophylla*) is a

shrubby perennial with purple blossoms and an enormous root (well over 10 kg.).

It would be unforgivable to finish this paper without reference to the voluminous cactus tribe. Saguaro, in Arizona, is the one that steals the show with its height up to 50 ft. (15 m.); it is highly restrictive as to location and can only be grown under special conditions in humid regions or cold climes (*Cereus giganteus*). But numerous other cacti are spectacular in a humbler way. That, however, is a story in itself.

Even more numerous, if less aristocratic, shall we say, are the sunflowers. One annual sunflower, *Helianthus petiolaris*, has much more character than the regular sunflower of Kansas plains; it might well find a place in a mixed border.

Perhaps the most drought-resistant ornamental shrub of the plains is *Rhus trilobata*, called skunkbush sumac, on account of its pungent wood smell. It is a typical illustration of a shrub that survives hardships once established but has never gotten used to being transplanted as our common garden shrubs.

And now we must bring this list to a finish. Practical conclusions are the following:

- (1) Here is an almost unexplored field of plant introductions, many fully as noteworthy as those from China, Japan or Turkestan.
- (2) Some grow under conditions similar enough to those in cultivated gardens to be easily adopted, even now.
- (3) Others, while desirable and beautiful, cannot easily be so incorporated but should be given a chance. Certainly, for instance, the Rocky Mountain columbine should be given a

royal welcome in any garden (*Aquilegia coerulea*).

- (4) Above all, the International Horticultural Congress might well be interested in continued research and education in this promising field. As horticulture opens up new horizons and new climatic conditions, there will be more and more needs for such plants that do not fit snugly in humid climates, be they temperate or sub-tropical.

If I have put these special American "natives" in the spotlight, I hope you will understand how easy it is to become enthusiastic about such a gold mine of available plant material.

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THE GENUS *Crataegus* or hawthorn is a prominent representative of the north temperate zone flora. Over 1,000 North American species have been described and an additional 90 occur in the Old World. *Crataegus*, with its wide distribution and multitudinous species, offers a diversity of descriptive names.

The word *Crataegus*, itself, is quite descriptive. It was derived from the Greek *kratos* (strength), which alludes to the strength of its wood.

There are several species of *Crataegus* whose names were derived from the areas to which they are native. *Crataegus arkansas* occurs natively in the bottom-lands of the White River near Newport, Jackson County, Arkansas. *Crataegus hudsonica* is native to the rolling hills in the valley of the Hudson River, near Albany, New York.

Many of the specific names of *Crataegus* are quite descriptive. In *C. mollis*, the species name refers to the soft downy or pubescent quality of the fruit. *Crataegus Oxycantha*, the English hawthorn, had its specific name derived from the Greek *oxys* (sharp) and *kanthos* (thorn). This refers to the long, sharp thorns which occur on the branches. *Crataegus monogyna* has one seed and the specific name suggests this. *Monogyna* comes from the Greek *monos* (one) and *gyne* (woman or female).

Some of the most famous of America's plant scientists have had hawthorns named in their honor. *Crataegus Grayana* was named in honor of Asa Gray (1810-1888) the famous Harvard University plant geographer.

Crataegus Sargentii received its specific name from Charles Sprague Sargent (1841-1927) the first director of the Arnold Arboretum. Sargent authored two famous books, *The Silva of North America* and *Manual of the Trees of North America*. These two books are still considered to be the most reliable ever published on the subject. The taxonomic coverage of the North American representatives of *Crataegus*, in these two works, is among the most comprehensive ever attempted.

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THE COVER

Quaking aspens (*Populus tremuloides*) growing at
Cumbres Pass. Photograph courtesy of Mr. Carl
Blaurock.

APPRECIATION to Denver

Botanic Gardens Committees

Denver Botanic Gardens has been growing and will continue to grow in its scope of activities, added features and services to its members and to the public. The rate of growth of this development would most certainly be stunted and its beneficial aspect diminished were it not for the voluntary assistance rendered to this institution by the dedicated people who work on our various committees. It is impossible for me to wholly express my appreciation to the chairmen of these committees and to the wonderful people who work with them in solving the many problems which must always confront the officers and staff of any organization such as this which is growing into maturity.

For the competent manner in which they have handled the enormous amount of responsibility which I have placed upon their shoulders during 1963, I extend my sincere thanks to:

- Mrs. James R. Arneill, Jr. *Chairman*, Annual Dinner Committee
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I hope that all of you will realize how important your services have been in this past year. Your committees are an integral part of this organization without which we could not continue to function as successfully as we have in the past. With this go also my thanks to each and every one who served on your committee.

LAWRENCE A. LONG, *President*
Board of Trustees

WINTER PROTECTION OF ROSES *in Colorado*

CLYDE E. LEARNED

R OSES ARE VERY hardy plants and many varieties will go through the ordinary Colorado winter without too much damage. However, we do have some varieties which are not very winter resistant and as we do occasionally have a very severe winter with wide and rapid fluctuations in temperature the results are often disastrous if we do not have some form of protection. Actually, the greatest damage to roses is caused by a cold snap in the late fall and early winter when the canes are green and full of moisture or when a warm spell occurs during the winter followed by a cold period with a rapid drop in temperature.

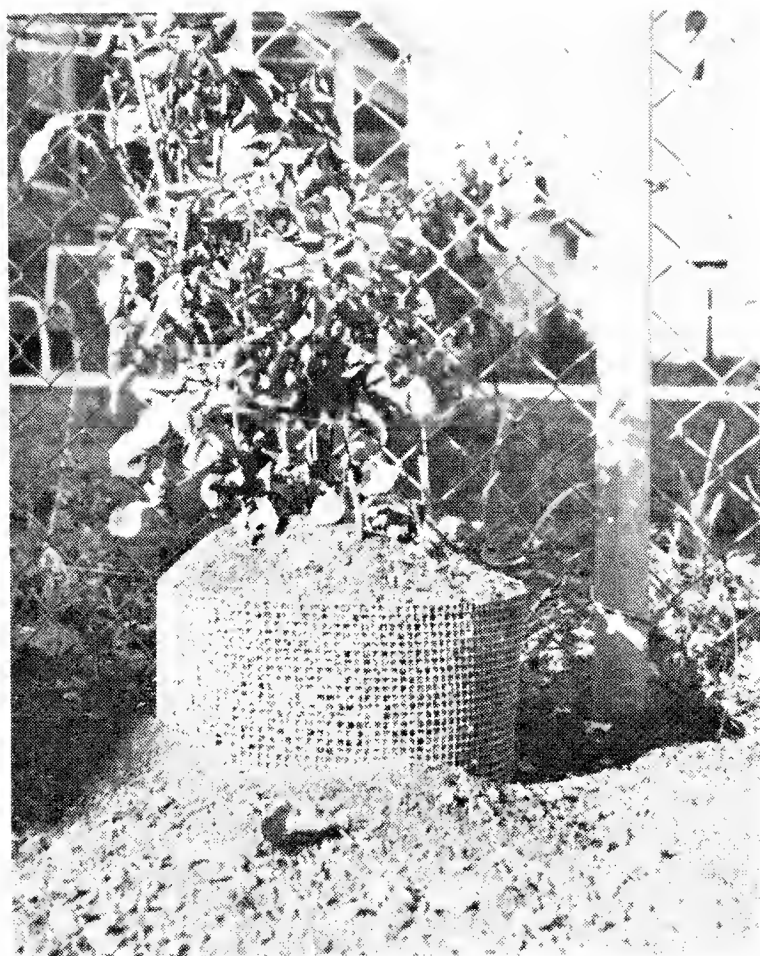
The past two winters of 1961-62 and 1962-63 with their strong winds and periods of alternate thawing and freezing were extremely harmful to the rose plant tissues. This should have convinced all rose growers of this region of the need for adequate winter protection.

Although I do know that the winter loss of roses is rather large in Colorado I have been unable to find any reliable data to actually show what the comparative loss is on protected and unprotected roses. However, I came across the results of a recent survey

made by the members of the Cincinnati, Ohio rose society. This survey covered a total of 2,658 rose bushes and indicated there was only a 1% loss of roses by the members who covered or protected their roses during the winter, whereas the loss suffered by the members who provided no protection was 8%.

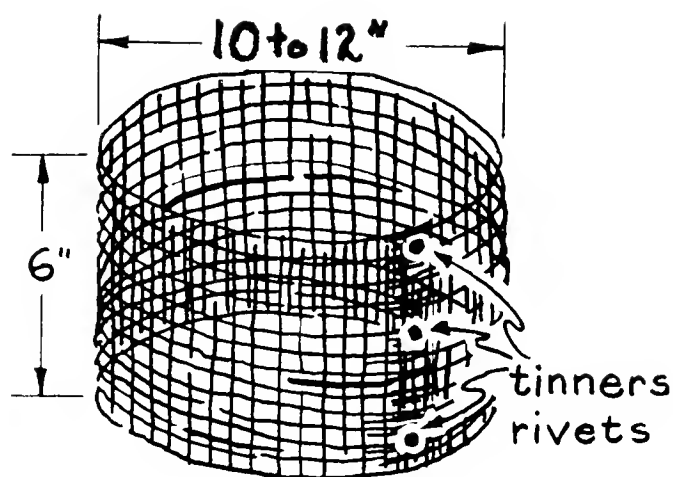


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JOHN S. ARMSTRONG



When covering your roses for the winter it is reasonable to assume that the greater the depth of cover the greater will be the protection afforded the rose bush, with the result that you will have more live wood and undoubtedly better quality blooms in the spring and early summer months. As our rose shows are usually held during the last week in June it is also reasonable to assume that the exhibitors who cover their roses during the winter will have more and better roses to exhibit.

For protecting roses in the winter the usual and most common practice is to build a cone-shaped mound of earth about 8 to 10 inches high around each bush. A fairly light top soil or sandy clay provides a good cover. Avoid material that packs hard and becomes soggy when wet. If feasible it is suggested that the cover material be obtained from a source outside the bed, rather than digging up material from the rose bed and possibly disturbing the rose bush roots. For the past several years I have been purchasing a planter box soil mix or a mixture of



Sketch showing how to make wire mesh cylinders.

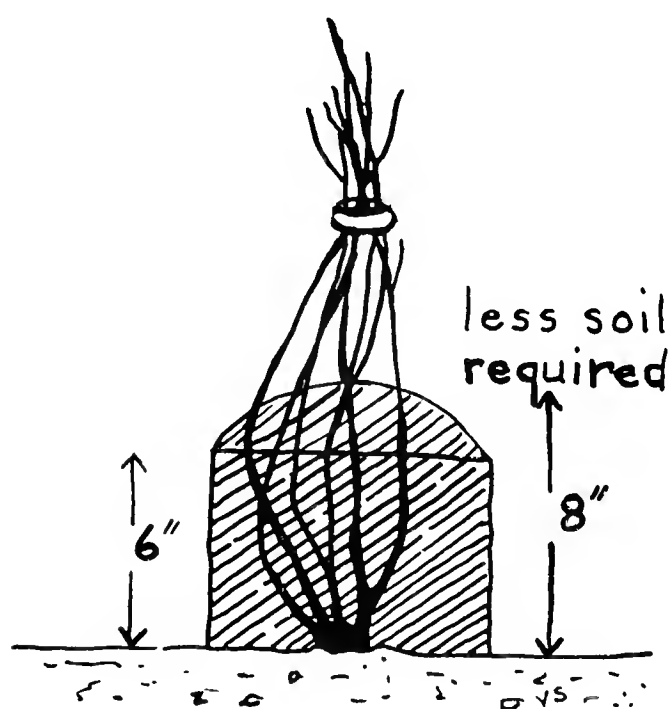
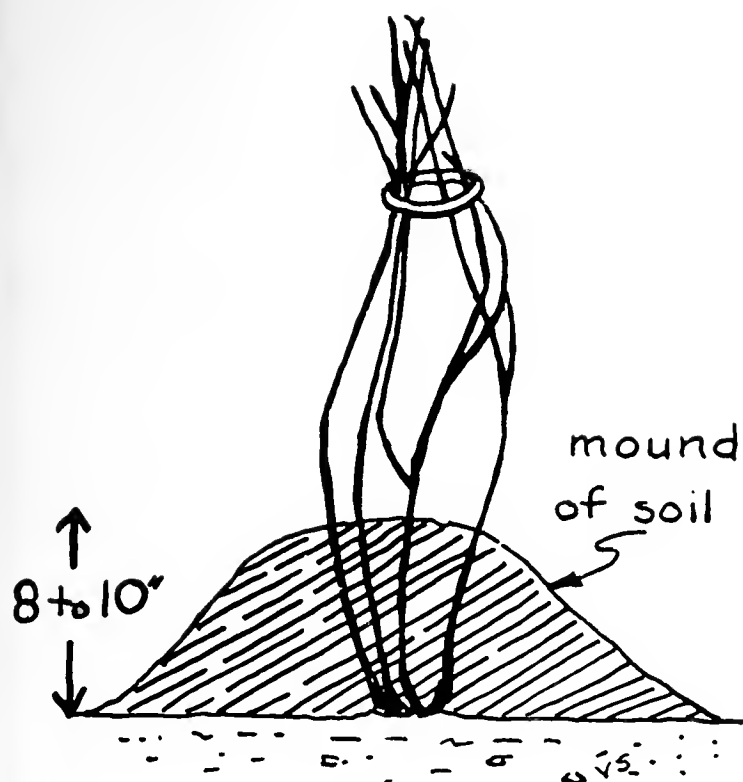
top soil and peat moss to cover my roses. This operation is usually performed during late November.

For a more positive winter protection it is suggested that open end cylinders filled with soil be used. The cylinders are made of galvanized hardware cloth, four meshes to the inch, are six inches high and of varying diameters ranging from 10 to 12 inches.

By varying the diameter it is possible to meet the needs of the small and



Photo courtesy of Jackson & Perkins Co.
KING'S RANSOM



larger bushes and to nest the cylinders to facilitate summer storage.

Hardware cloth method requires only one-half as much soil.

larger bushes and to nest the cylinders to facilitate summer storage.

Sometimes you will have a few bushes that are so large that the 12-inch cylinder is not large enough. In this case it will be necessary to resort to a large cone-shaped mound of earth.

After the cylinders are filled with dirt I give the beds a good soaking and then spread about one inch of cow manure in the valleys between the rows of cylinders.

To form the cylinders, six-inch strips of hardware cloth are shaped into a circle and fastened at the ends with three four-pound galvanized tinner's rivets which are a little over $\frac{1}{8}$ inch in diameter and $\frac{3}{8}$ inches long. The ends of the hardware cloth are overlapped three meshes or $\frac{3}{4}$ of an inch, the rivets being placed and flattened in the middle mesh.

A 100-foot roll of hardware cloth 24 inches wide will make about 132 cylinders six inches high.

The roll is cut into strips six inches wide as follows:

10-inch diameter cylinder 32½ inches long.

10½-inch diameter cylinder 34 inches long.

11-inch diameter cylinder 35½ inches long.

11½-inch diameter cylinder 37 inches long.

12-inch diameter cylinder 38½ inches long.

The cost of the cylinders will range from 20 to 25 cents each, depending

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upon the price paid for the roll of hardware cloth.

In the late fall to prevent cane breakage by high winds and heavy snows, the tops of the canes are tied together with cord making it easy to drop the hardware cloth cylinders down over the bush.

The cylinders are then backfilled around the canes with a sandy loam or other suitable material. It requires only about one half as much material to backfill the cylinders as would be required for an equivalent height of unretained mound and a much more positive protection is given the rose bush.

As climbing roses are normally more hardy than hybrid teas I usually protect them with a three to four inch cover of dirt.

In closing, it might be well to add that the objective of a winter cover is not to keep the bushes warm but rather to provide an insulation and keep them from being damaged by a sudden and rapid drop in temperature.

Of course the ideal winter protection would be to have a blanket of snow remain on the bushes all winter. This is something that does not happen in Colorado but does happen in some of the northern states.

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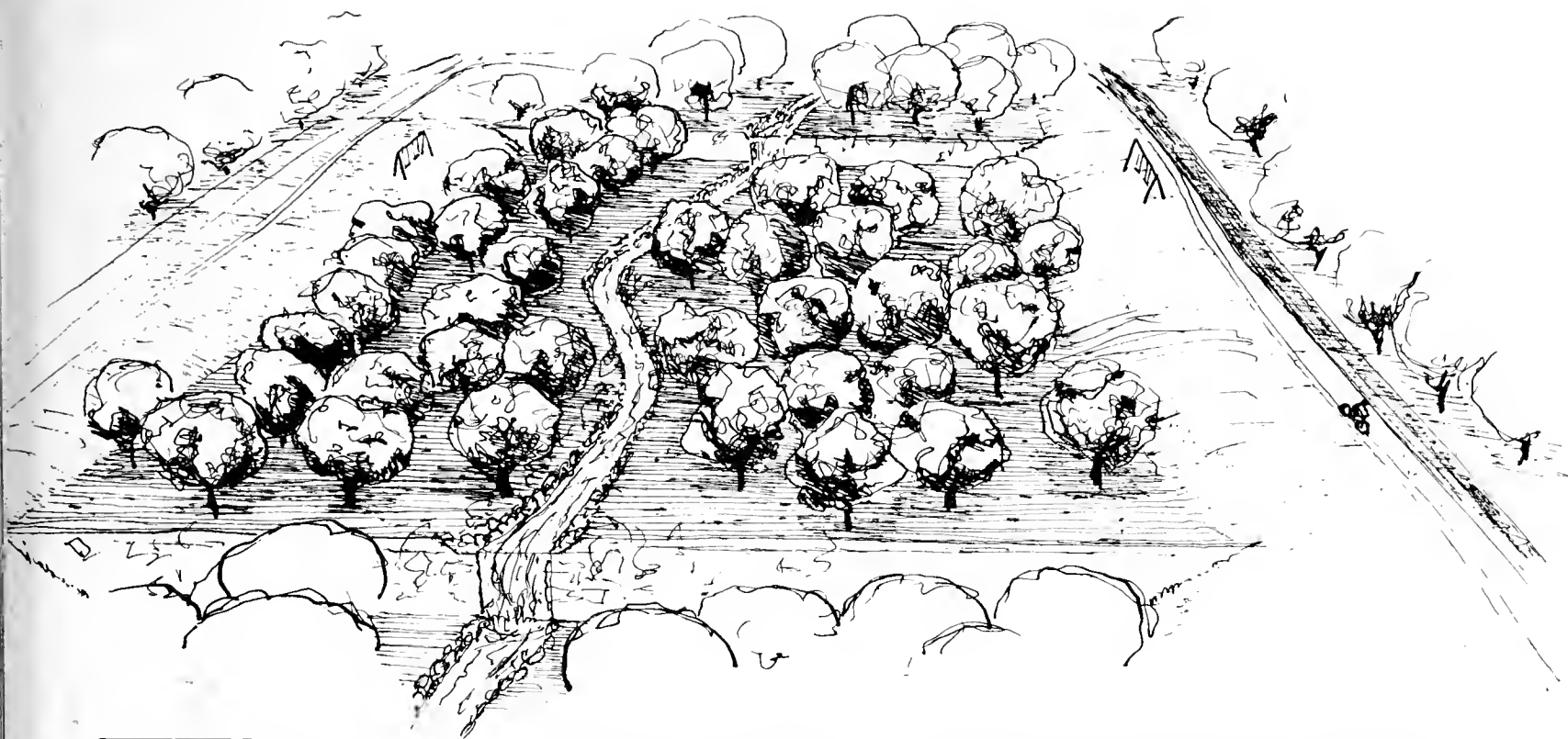
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Harvard Gulch

S. R. DEBOER

DENVER'S HARVARD GULCH presents an extremely interesting problem in city building. Nearly all cities have similar difficulties. In the first place there is the need for land for parks and playgrounds which is difficult to acquire but usually is available as cheap land along creeks and rivers. There is the problem of drainage. Surface water must be taken care of without damage to property. Land development for city use must be considered.

The Denver Plan of 1929, Volume I

One of these problems cannot be worked out without considering the others. This was realized in the "Denver Plan, Volume I" prepared by the Denver Planning Commission in 1929. This plan shows a treatment of Harvard Gulch for park and drainage purposes. It was a dry gulch at that time. The land it drained was open grass and prairie land. The run off water was

gathered in the city ditch which discharged into the Washington Park lakes. Much has changed during the past years of rapid building. The velocity of the water, as it runs off the adjoining lands, is many times greater than it was. The connection with the city ditch and park lakes has been broken and the Gulch now becomes a roaring creek at times and is a small stream at all times.

An Attractive City

The men on Denver's Planning Board, in 1929, were imbued with the principle that a city must not only be efficient but must be a pleasant place in which to live. The work of civic beautifying of a decade before was still very much in the minds of all. Traffic had not as yet become the dictating monster that it is today. Zoning was still in its infancy. Denver's first zoning ordinance was only four years old

and had been adopted by very much the same group of men.

Additional Park Land

One of the policies set forth in the 1929 report was designed to insure that Denver had sufficient park acreage. Land was difficult to acquire and the bottom lands of the creeks were of no value for building purposes. At least, so we thought. The plan contained many park areas which have since been acquired. Money for land purchase was difficult to find. The City has always been hard up for money as long as I can remember but certainly there is more money today than in 1929.

40,000 Tax Delinquent Lots

Times change and never has this been more true than it is today. The peak economy of the 1920's made way for the depression of the 1930's. Denver real estate had been low for a long time but now it reached bottom. The lowlands along the streams were all tax delinquent and could not even be sold for taxes. Barnum Park and Berkeley Park and the east end of Park Hill were full of tax delinquent properties. The Planning Board made a study of this problem and, in fact, mapped them. It was indeed shocking. Mayor Benjamin F. Stapleton, who had always been an advocate of a beautiful Denver, realized that this was the time to acquire land for parks. A strip, 250 feet wide, was acquired along Harvard Gulch. Ruby Hill, Barnum Park Lake and several other valuable sites were acquired by this method. The City acquired them by the simple process of paying itself the delinquent taxes. The effect of these park purchases on surrounding properties was great.

The Gulch Becomes a Creek

Harvard Gulch, at one time, drained an unbuilt area of prairie grassland.

There were no streets or roofs to drain off the water rapidly. During the present boom period the land was laid out with streets and homes were built on the lots. The usual rule is that the water runs 2½ times faster from a built-up area but along the Gulch, I believe the run off is much faster than this. So, instead of a dry gulch draining into the park lakes, we now have a creek which has fast run off at times and which is a small creek at all times.

Present Condition

Flood waters from Harvard Gulch now run over University Boulevard, Downing and Logan Streets and inundate Wesley Avenue at Sherman Street and Broadway at Iliff Avenue and adjoining streets for four blocks. This happens every time there is a big storm. At Broadway the condition is intolerable and a serious handicap to business. A few years ago the City submitted a plan to put Harvard Creek into a big sewer at a cost of over 8 million dollars. The cost of this project was to be assessed against the abutting property. The neighborhood protested this for after all the residents were not to blame for the condition and would not benefit by the sewer. They felt that the City at large created the condition and should pay for the work.

Park Treatment Now

In spite of the fact that many lots have been sold in the creek flood area it is still possible to carry out a park treatment. Doing this will redeem the value of properties along Harvard Avenue which now are depressed and give the neighborhood a number of play spaces, picnic places and a walkway and bicycle path for the whole length of the creek. With the present upsurge of bicycle riding, this would create a safe place for youngsters to ride. The

whole plan of south Denver would benefit by such a treatment as it would create a green belt through this part of Denver which would be as important as the green belt created by the Cherry Creek planting. A treatment like this was applied to the creek running through Santa Fe, New Mexico, many years ago. Check dams reduce the velocity of the water and flood plains planted with trees and native plants slow down the heavy current.

A Work Program

The following items, I believe, should be considered in a program of action on Harvard Gulch:

1. A sewer of adequate size, in Wesley Avenue from Sherman Street to Delaware Street or to the river if money is available, should be constructed. There is no other way of getting the water across Broadway.

2. Retarding reservoirs should be constructed above Logan Street, Downing Street and University Boulevard, with tree planting in the reservoir bottoms to prevent unsightly conditions and to retard the water.

3. Low check dams should be constructed to reduce the velocity of the water.

4. All streets should be closed except those needed for through traffic in order that the park treatment, bicycle paths, etc., can be continuous.

5. Small parks should be developed, such as the one on York Street, where the dense population makes a park essential.

6. The construction of play spaces, where possible, with nearby picnic places, bicycle paths and walkways.

7. Consideration should be given to the construction of a large park area along Harvard Gulch from Logan Street to South Emerson Street.



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ADA R. PERRI

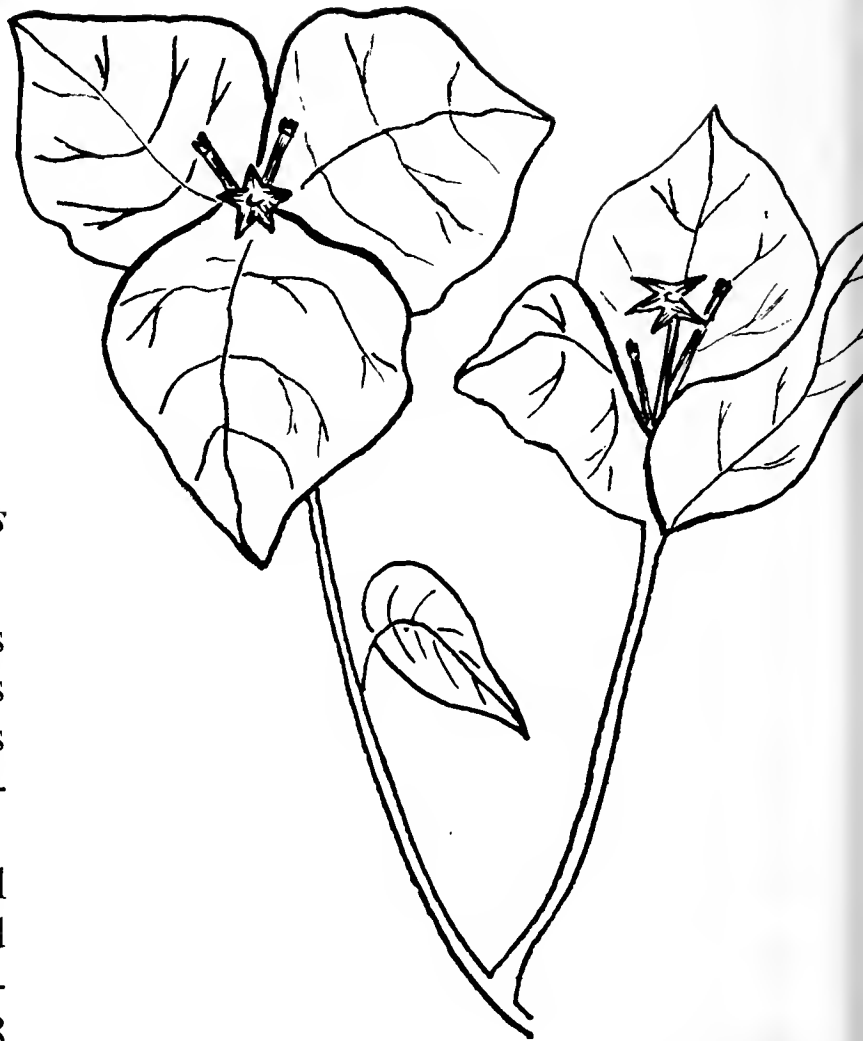
Lakewood Flower Shop & Greenhouses

ONE OF THE BEST flowering climbers is the Bougainvillea vine with its inconspicuous flowers but showy bracts that shroud the entire plant in a gorgeous mass of color.

Native of Brazil, it does best in full sun. It can be grown in a ground bed in the greenhouse and will grow vigorously if the bed is prepared about 18 inches deep with fibrous loam, well drained with crock or gravel. A trellis or wire support is necessary. The Bougainvillea will bloom almost continuously if it is not pruned severely but left to ramble freely. While it is blooming it should be kept moist. After flowering, the plant should be cut back slightly and kept on the dry side until new growth starts. Feed about every three months.

Bougainvillea can also be grown in the home in a sunny window. It will not bloom as profusely, however, because of the limited sunlight and usually limited space, making it necessary to keep it pruned back.

Propagation is from cuttings of half ripened wood taken preferably in March to May. These are easily rooted in a mixture of peat moss and sand or straight sand.



Bougainvilleas come in many colors. At this writing, we have in bloom in our greenhouses the Barbara Karst (red), Betty Hendry (iridescent, peachy-gold), Orange King (bright orange) and a purple one, the name of which I do not have.

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Taxonomic Terminology

JOSEPH W. OPPE

THE FOLLOWING represents the first of a series of articles designed to acquaint the laymen with the descriptive terminology applicable to the plant sciences. More specifically, during the coming months, we will be dealing with the terminology of the plant taxonomist. Plant taxonomy being that science which deals with the identification, nomenclature and classification of plants.

The stem, bud, leaf, inflorescence, flower and fruit will all be discussed in upcoming issues of *The Green Thumb*. A great portion of the new terms will be of Latin or Greek derivation while some will be from the English. Those of us with experience or training in botany or horticulture will be quite familiar with most of the terms. But, for the uninitiated it will be an opportunity to become more familiar and thus more adept at dealing with and speaking about the plants around them.

The Stem

Stem terminology may be handily divided into four categories: (1) axis, (2) direction or habit of growth, (3) modified stems and (4) duration or texture.

AXIS The *axis* of a plant is its main stem or trunk (Figure I). Located on the axis will be buds, flowers or leaves. The location of a bud, flower or leaf on the axis is a *node* and the distance between two adjacent nodes is an *internode*. The leaf is attached to the axis by a petiole thus forming an angle. This angle, formed by the uniting leaf and axis, is known as the *axil*.

Plants having ordinary, above-the-ground stems which produce leaves, buds and flowers at the nodes are said

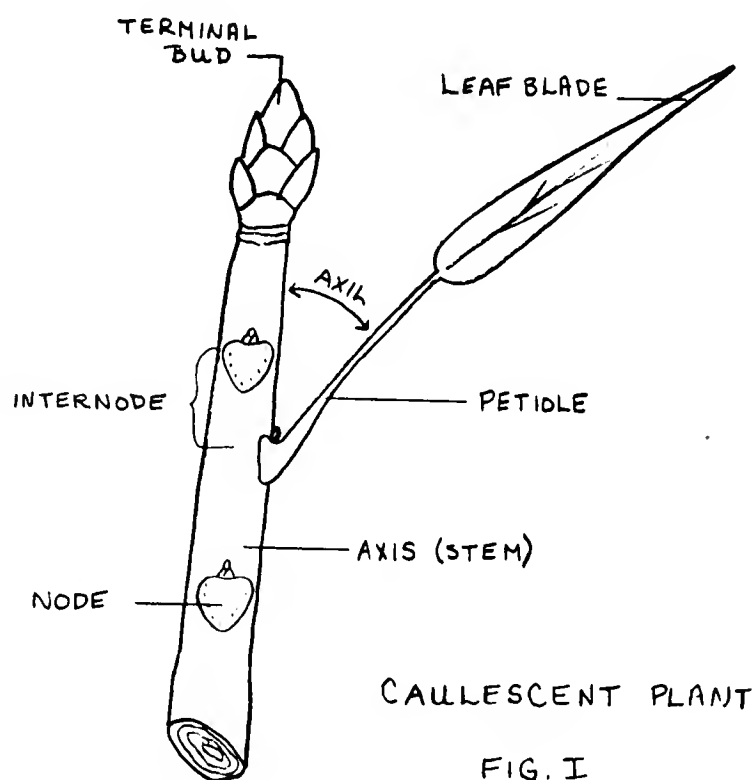
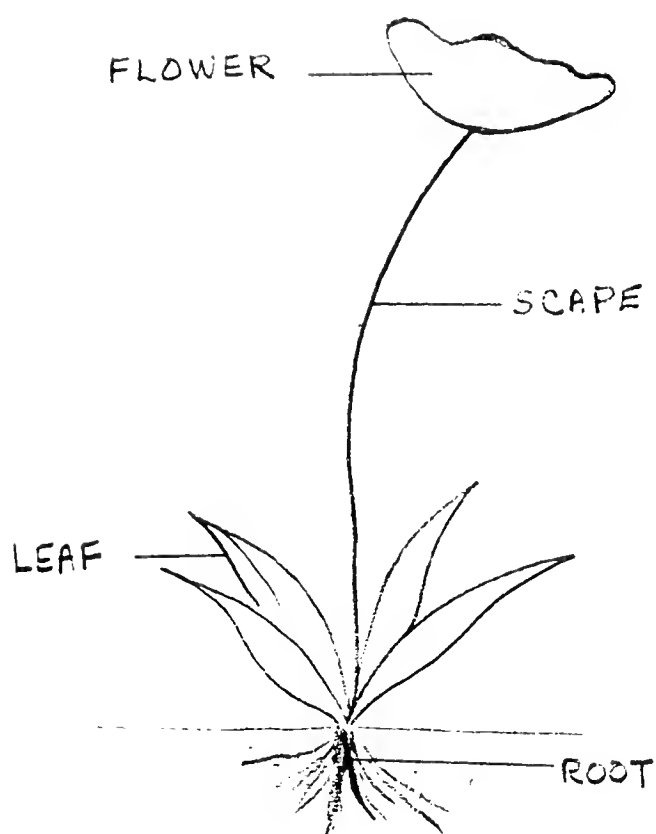


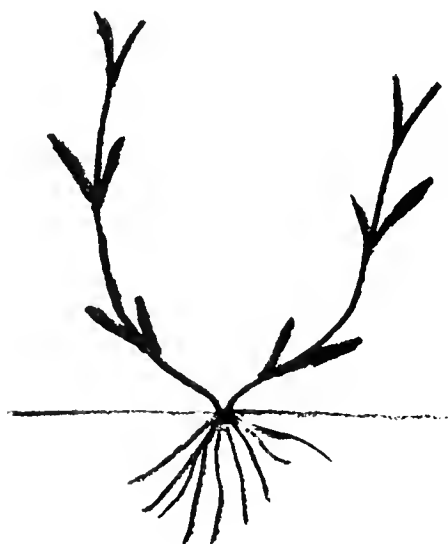
FIG. I



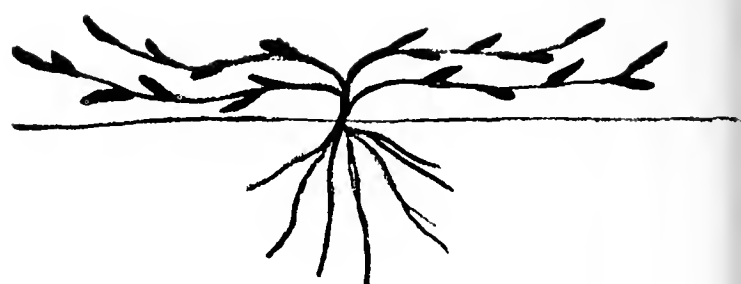
ACAULESCENT PLANT FIG. II

to be *caulescent* (Figure I). Those which have inconspicuous stems, the leaves being all basal, are *acaullescent* (Figure II). Acaulescent plants such as spring beauties (*Claytonia* sp.) and some kinds of violets (*Viola* sp.) produce a leafless stem or scape on which the flowers are borne and they are said to be *scapose*.

DIRECTION OR HABIT Some of the terms used to describe stem habit types are common but when used in a taxonomic sense they have quite specific meanings. These stem growth characters can best be understood by study-



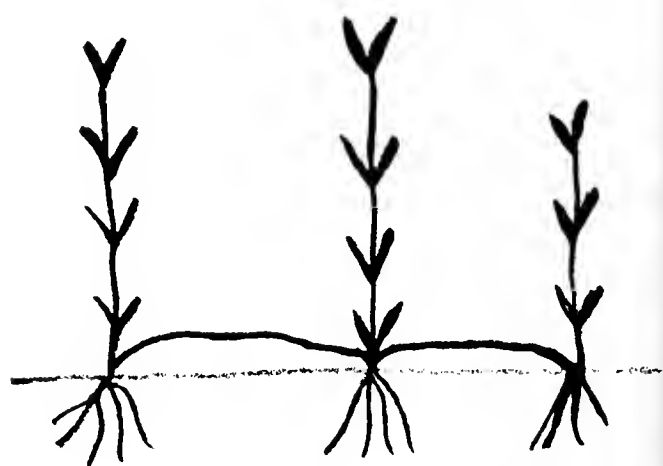
A: ASCENDING



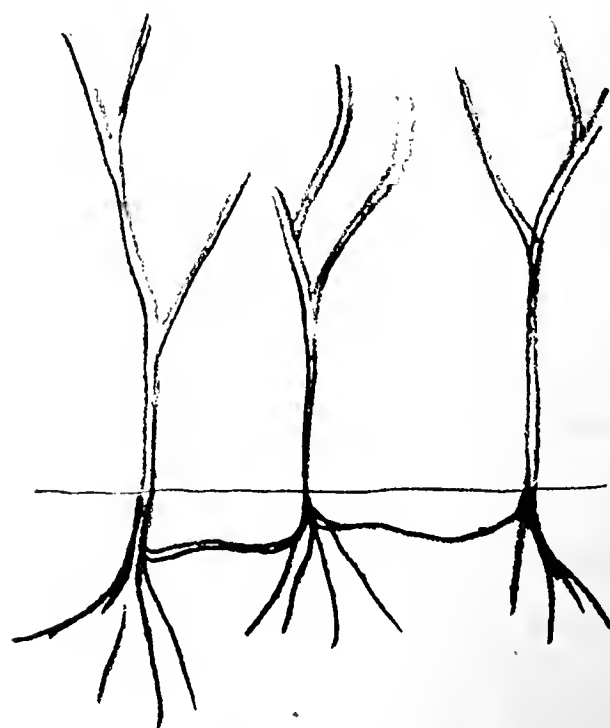
B: DECUMBENT



C: PROCUMBENT



D: STOLONIFEROUS



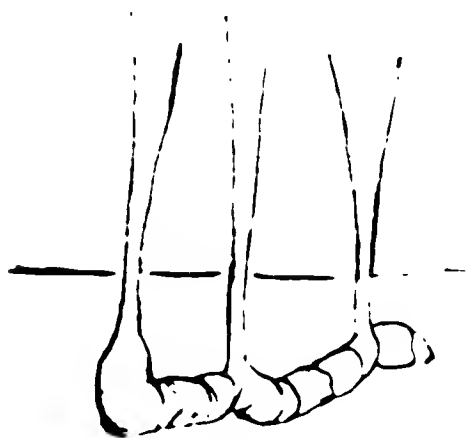
E: SOBOLIFEROUS

ing the following diagrams: (Figure III, A through E).

In addition to the above, a stem may also be vine-like (a *liane*). Lianes are of two basic types: (1) *Clambering*, growing over objects and (2) *climbing* or deriving their support from other objects. The latter may derive their support by the stems twining (wistaria), by means of tendrils (grapes), by twisting leaf stalks (clematis) or by producing aerial rootlets (English ivy).

MODIFIED STEMS There are a number of modifications of the typical above-the-ground stem. These, for the most part, are subterranean and are not easily recognized as stems.

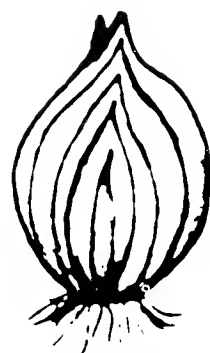
The common "rootstock" of the iris



RHIZOME
FIG. IVa

is not a root but is a modified stem in the form of a *rhizome* (Figure IVa). This creeping underground stem or rhizome consists of a series of nodes and internodes, features which are peculiar to the stem. At the nodes we usually find the roots produced with the buds being found in the leaf axils.

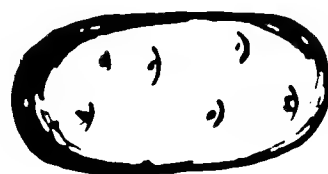
Bulbs are short, usually flat stems covered by non-green, scale-like leaves (Figure IVb). Some bulbs, such as those of the onion or tulip are covered with a thin, membranous tunic, others have a fibrous and reticulated tunic, while still others may have scales which



BULB
FIG. IVb

are naked (true lilies). The small bulbs which are produced at the base of the scales of a mature bulb (*amaryllis*) are known as *bulbels*. *Bulbils* are miniature bulbs produced in the axils or sinuses of leaves.

Tubers, such as those produced by Irish potatoes, are underground stems modified for food storage (Figure IVc). They have apparent tiny scale-



TUBER
FIG. IVc

like leaves and buds (eyes), two of the characteristics common to all stems.

Corms, which are often confused with bulbs, are solid, fleshy subterranean stems which lack the scale-like leaves of the bulb (Figure IVd). Glad-



CORM
FIG. IVd

iolus and crocus both exhibit this peculiar type of modified stem.

Other types of modified stems are the *cladophyll* of the asparagus which resembles a leaf and is found in the axil of a tiny, bract-like true leaf. The so-called leaves of some cacti (*opuntia*) and other succulents are not leaves at all but true stems that are flattened and resemble leaves.

DURATION AND TEXTURE The terms herb, shrub and tree occur frequently in our discussion of plants. However, when asked to define them we are often at a loss for words. To aid in the solution of this problem the following precise terms are offered: *Herbaceous*, dying to the ground at the end of the growing season; *Suffrutescent*, stems which are woody at the base with herbaceous distal portions; *Fruticose*, woody throughout with sev-

eral main stems (shrubby); *Arborescent*, tree-like, woody, usually with only one main axis (trunk).

Duration or the life-span of a plant is described by the terms annual, biennial and perennial. An *annual* is a plant which lives but one year, during which time it completes its life cycle (vegetative growth, flower production and finally the production of seed). *Biennials* take two growing seasons to complete the same cycle. The first year is usually spent in a vegetative state with food being stored. During the second year the flowers and seed are produced. *Perennials* live from several to many seasons and typically bloom every year after the first.

Flowers

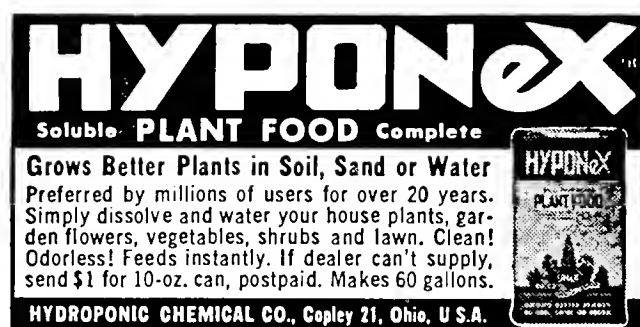
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TWO OREGON GRAPES

S. R. DEBOER

EARLY LAST SPRING, the row of Oregon grapes (*Mahonia aquifolium*) in front of my office suddenly turned brown. The leaves had been a beautiful dark and shiny green all winter but now they were brown and dry. Evidently the severe cold spell we had, followed by sunny summery weather, was too much for them. They had never acted that way before. I wrote them off, together with my two big and old pyracanthas and my Blireiana plum. But, they recovered. The pyracanthas are slowly coming back, the plum is dead but the Oregon grapes are more beautiful than ever. We cut off the dead tops and the plants grew. Though they had no flowers this year, the foliage was striking in appearance.

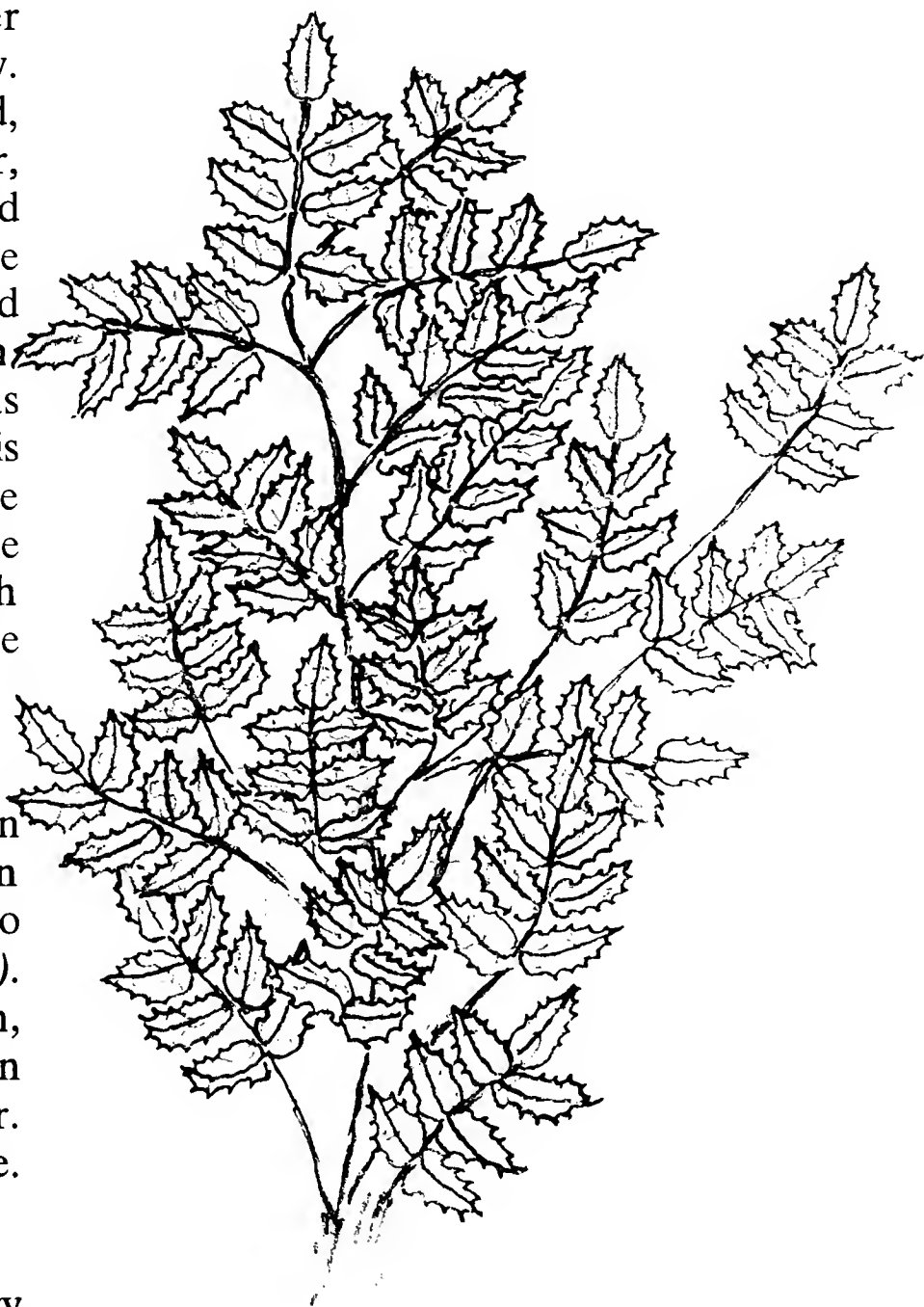
Two Oregon Grapes

On the bank of an old irrigation ditch I have another patch of Oregon grapes. I refer to them as "Colorado Oregon grapes" (*Mahonia repens*). They are creepers, only a foot high, with shiny evergreen leaves which turn a beautiful mahogany red in late winter. They did not suffer any winter damage.

A New Name?

The two Oregon grapes are very different but until a few years ago they

were both listed as Oregon grapes in plant lists. We now distinguish them as *Mahonia aquifolium* (the true Oregon grape) and as *M. repens* for our



Mahonia aquifolium

native plant. The first one is three feet high and has a very shiny leaf. The Colorado species has foliage which is less shiny and is only a foot high. The great distinction lies in the fact that *M. repens* has underground runners (stolons) and spreads that way whereas *M. aquifolium* has no runners and is a compact shrub. Our native species is one of the few broadleaf evergreens we have and it needs a new name instead of the "Colorado Oregon grape." I would be glad to offer a prize of five dollars in a contest for the best name for this Colorado plant. It certainly is not an Oregon grape since it is neither from Oregon nor is it a grape.

Both Are Very Ornamental

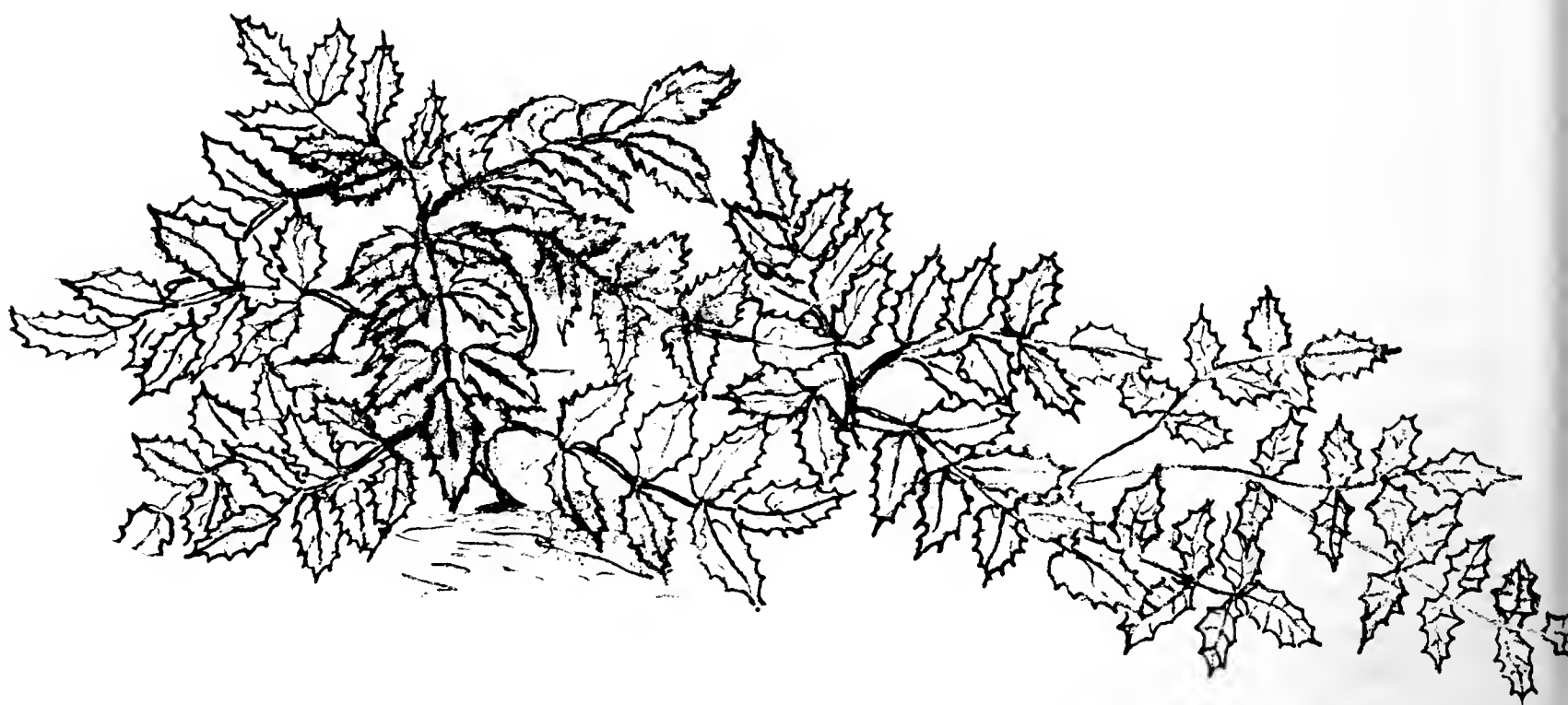
We use both of the Oregon grapes in many of our plantings. They seem to prefer half shade and are very effective against a light stone wall. Where winter color is needed, they are brighter and shinier than anything I have seen. The flowers are a bright yellow and the berries are blue and

arranged in more or less grape-like clusters. They are edible says Walter Pesman in his book "Meet the Natives." Colorado is practically without native broadleaf evergreens and those we have are known very little. The evergreen ceanothus could well be used, I believe, but in the meantime, the Oregon grape is a fine addition to our plant lists.

Colorado's *Mahonia repens* is very effective as a ground cover under trees and also in the full sun. We have collected many of them in the foothills, often with poor success. On Clermont Street Parkway at Fourth Avenue we planted large beds of them, partly for winter effect and partly to replace annual plantings but mainly to see what they would do. Of the first ones planted, only a third grew but by keeping at it we finally succeeded in filling the beds. There is another bed on Marion Street Parkway.

A Joke on a Plant Collector

Now I must tell you a joke on one of our plant collectors. He and I had



Mahonia repens

been scouting the north slopes of Genesee Mountain for park material. We got into a big argument over a small plant with dry berries. It was February and John said they were Oregon grapes which had lost their leaves due to the winter. I thought they were poison ivy. He was much older than I and we left it that way. We were planting Berkeley Park and the next week John sent us a wagon load of shrubs and plants. Neatly bundled together were the poison ivy plants. We took them and busied them deep into the ground. A few days later there was John. Like all parkmen he talked very loudly. "By gosh! Dee, you were right. The men are covered with poison ivy rash on the

backs, legs, everywhere." I never told on John as he was a valuable plantsman and parkman.

Plant Collecting Now

You know, of course, that wholesale plant collecting is now taboo. We have a law prohibiting it. Besides, one day as I was rambling along collecting the "Colorado Oregon grape," one of our nurserymen looked over the fence with a rather superior smile on his face. He was growing *Mahonia repens* from seed and had discovered that they transplant very easily. You can buy better plants for a low price now and at far less cost than you can collect them. I wished John and I had known that years ago.

LEE CHAMBERS

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RUSS SMITH

ONE OF THE FUNCTIONS of a botanic garden is to grow plants for experimental and display purposes. In years past the Denver Botanic Gardens were no exception. But, in the summer of 1961 a new order of gardening was begun and in addition to the traditional plants the crop included a number of teen-age boys.

By court order of Judge Philip Gilliam, some of the most delinquent boys in Denver were assigned work under the Juvenile Court Work Program. There were two work crews established under this program: the Mountain Parks Crew and the Denver Botanic Gardens Crew.

The Mountain Parks Crew is pri-

marily concerned with assisting in the maintenance of Denver's Mountain Parks. Their work consists of making routed wood signs, concrete picnic tables, shelter houses, stone fireplaces and the thinning of forests.

The work at Botanic Gardens is under the direction of Dr. A. C. Hildreth and the immediate supervision of Mr. Bob DeVries, an employee of the Juvenile Court. Under their direction, these delinquent boys have planted and cultivated over 20,000 flowers and vegetables and have participated in caring for many plants. They have assisted in the construction of walkways, the maintenance of roadways and have performed many of the fun-

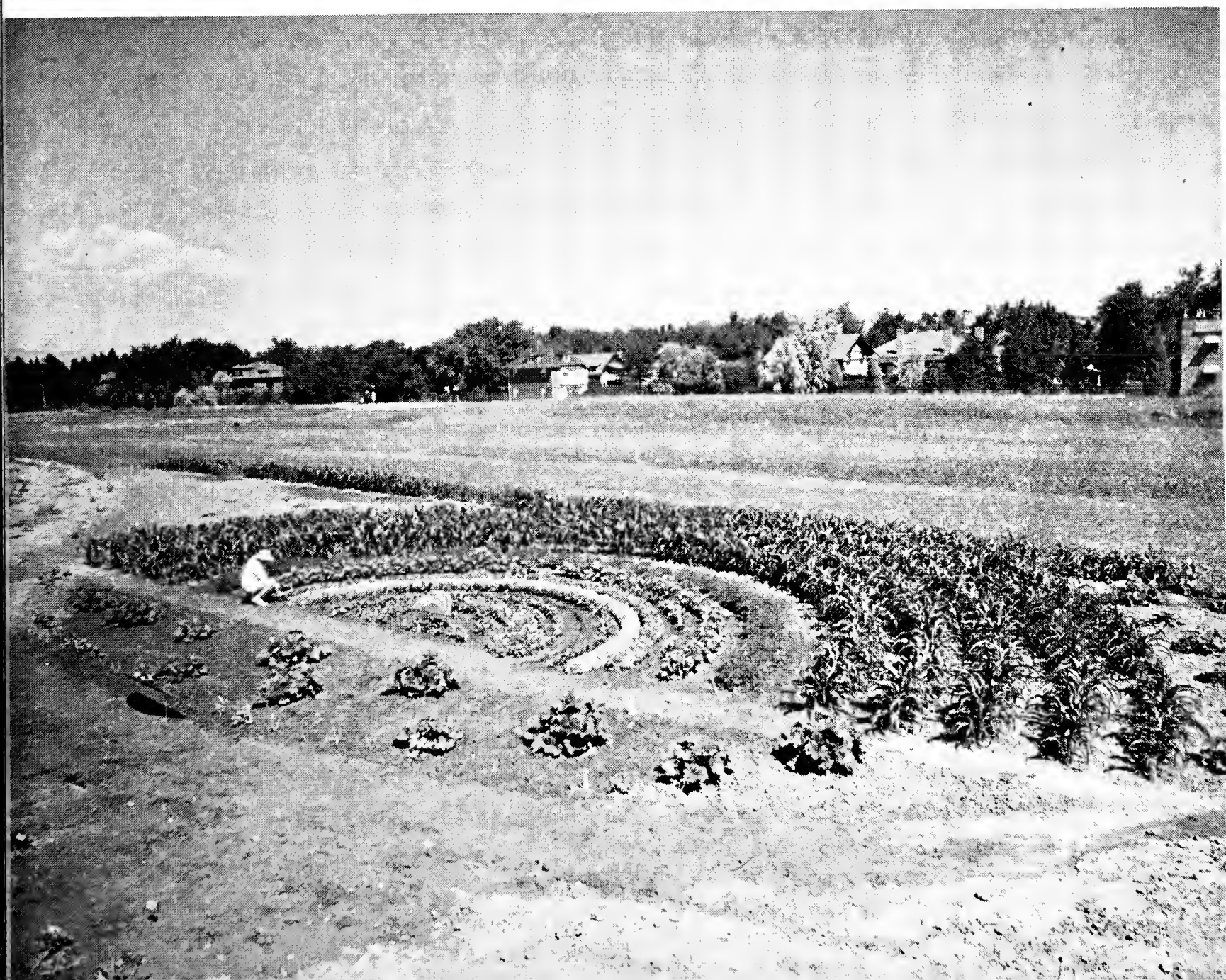
damental tasks, such as mowing, weeding and cultivating, which are so important to a botanic garden. And the work has just begun. The emphasis, however, has not been on what the boys can do for the Botanic Gardens but what the Botanic Gardens can do for them.

Many of the boys appearing before the court, boys charged with everything from auto theft and burglary to assault and robbery, are not ready for the responsibilities of probation — not ready to be returned to society. Up until the summer of 1960 there was no choice but to commit these boys to either Lookout Mountain School for Boys in Golden or the State Reformatory in Buena Vista. There was nothing for the boy who, though not ready for probation, did not seem to need long-term confinement in a state institution. It was for these boys that Judge

Gilliam created the Juvenile Court Work Program.

Technically, a boy given an opportunity on a work crew has been committed to the institution in either Buena Vista or Golden. However, rather than transport him immediately to the institution, the *mittimus* (the order committing him) is held in file. Whether this *mittimus* is activated or not is dependent entirely on the boy's conduct on the work crew. If he is unable to accept the responsibility given him, he is automatically taken to the institution. If, on the other hand, he indicates a desire to straighten himself out and makes an honest effort to do so, he may at the end of 90 days earn a suspended sentence and probation; which way it goes is up to him.

When first placed on the crew the boy lives at Juvenile Hall, leaving the building daily to report either to Bo-



tanic Gardens or Mountain Parks. If after a minimum of 30 days his conduct and attitude have been exemplary, he may be allowed to live at home and complete his work crew assignment by reporting to Juvenile Hall Monday through Friday at 7:30 a.m. This enables him to be returned to society gradually, while giving the Judge and the probation officer assigned ample opportunity to observe his progress.

Besides decreasing the number of boys who must go to state institutions and at the same time keeping them away from society, the work crews have done a great deal of worthwhile work that could have been done otherwise only at great public expense. In addition to the work in the Mountain Parks and Botanic Gardens, they have also performed other important tasks for the City and County of Denver. In the community at large, windows have been washed, swimming pools painted, picnic areas cleared and roadsides picked clean of litter.

But the most obvious and most important function of the work crew is to make non-delinquents of delinquents.

The work crew program has been based on the assumption that in most cases the delinquent is hoping to find in delinquency what most people are able to find in socially acceptable ways: a sense of identity, a feeling of accomplishment, an awareness of personal worth. Delinquency is often the last-ditch stand against insecurity, frustration and boredom.

It takes a two-fold approach to curb delinquency. First, the delinquent must be made to realize that society will not tolerate his anti-social behavior. Second, he must be offered an alternate way of satisfying his needs.

The Juvenile Court Work Program

has been effective in doing just this — showing the delinquent that a greater satisfaction and a greater sense of accomplishment and identity can be gained through creative rather than destructive activity. This principle was dramatized last summer at Daniel's Park. For days the boys had been pouring concrete picnic tables. Early one June morning they filed off the bus to find that the work of the day before had been reduced to a pile of rubble and twisted reinforcing steel. Never has a group of boys, several vandals among them, shown so much righteous indignation for so long a time.

To pour a bit of concrete, paint a sign, put a seed in the ground — these seem small accomplishments indeed. But it must be remembered that many of the boys going before Judge Gilliam have never built a model airplane, played on a baseball team or brought home an "A" on their report card. They may have stolen a car, vandalized a home or burglarized a service station but never stood back with pride to say to themselves, "I built that."

The work crew emphasizes creative, useful, group activity. Give even the toughest delinquent pride in his ability to work, let others see what he is able to do, praise him for a job well done and let him earn the privilege of probation and you have given him a push in the direction of responsible adulthood and citizenship.

The success of the work crew program has exceeded all expectation. Parents call Judge Gilliam, impressed by the positive change that has taken place in their boys. Probation officers note a distinctly better outlook toward life and the law. But most important, the records show that few of the work crew boys ever appear before the Juvenile Court again.

TREES...

In Relation to HOME PLANTING and Overhead UTILITY LINES

ARNOLD E. PERRETEN

I HAVE SPENT about 40 years in electric power work. Most of this time was spent in the supervision and planning the construction, maintenance and operation of overhead power lines. I have also spent many years in Shade Tree Committee work and in park promotion and planning. As a result of this experience I feel competent to cover the subject of shade trees in relation to home planting.

If tall trees are planted on streets, alleys or on rear property lines it is often necessary to trim the top of the tree periodically or to cut into the side of the tree. The former type of trimming causes the tree to become bushy and prevents the natural spreading of the limbs. The latter results in disfiguring the shape of the tree. Such trimming, even though performed by professional tree experts*, where the wrong type of tree was placed in a

questionable location, often results in the destruction of the natural beauty of the tree. Where low trees are planted in the vicinity of overhead utility lines, they are permitted to develop in accord with their natural growth and are a beautiful addition to the street and to the home and often serve effectively to cover the presence of the pole lines.

In modern cities we plant trees to satisfy five separate purposes:

- (1) The parking tree is planted primarily to improve the appearance of the street and to decrease the intensity of summer heat.
- (2) The framing tree is planted to improve the beauty of our homes.
- (3) The shade tree provides a cool place in the front or back yard.
- (4) The screening tree insures privacy in the outdoor living room.
- (5) The ornamental tree adds to the beauty of the home.

*The Davy Tree Expert Co. of Kent, Ohio is employed by the Public Service Co. of Colorado to do all electric wire clearance work in the Denver area.



American elms trimmed to clear a power line. While a good job of trimming was done, the natural growth of the trees was not permitted.

The Parking Tree

In new sections of a city with long continuous rows of one-story houses and curb sidewalks, the parking tree is seldom used today. Where it is used, trees should be selected to fit the future plans for the area.

If the street has been selected for overhead utility base lines (most utility lines are now joint telephone and power lines so we have one pole instead of two), small or medium height trees with a maximum height of 30 to 40 feet should be chosen. Such trees would include catalpa, hawthorn, the whole line of crab apples, golden honey locust, Russian olive, mountain ash, hard maple and red oak. The effect would be most desirable if the same variety of tree were selected for an entire block.

In a well designed electric distribution system most of the pole lines are

placed in alleys or on rear lot lines. It is well to remember that it is, however, necessary to place pole lines on approximately one street out of six to eight. Therefore, most streets are free of pole lines except those needed to support street lamps and the wires to supply these lamps. These wires are generally of such low voltage or so installed that a minimum of tree interference is experienced. On such streets, higher trees may be desirable. This is especially true in the areas where two story houses predominate. The American elm, soft maple and honey locusts are excellent examples of tall trees which do well in our Denver area.

The Framing Tree

Framing trees are not often used on the typical small city lot. Where there is sufficient space (on lots from 75 feet up), such trees may be very desirable to enhance the appearance of the home. The size of the framing tree must be selected to fit both the size of the house and the plot of land. The small to medium size tree usually proves most effective. These include Russian olive, pinyon pine, red oak and hard maple. In some cases, spruce or juniper may be very effective. If the front yard is large, several trees in a

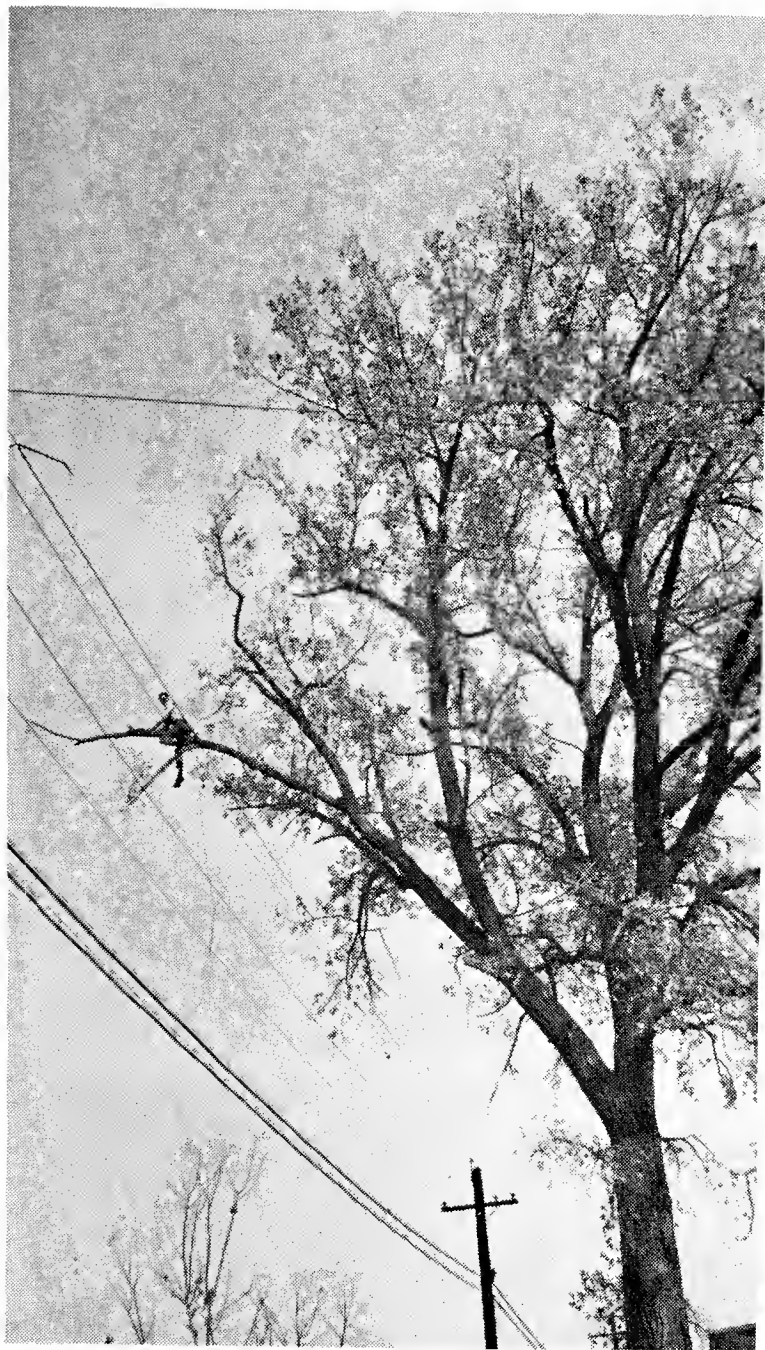
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A tree properly placed in regards to utility lines can be trimmed without destroying the natural beauty of the tree.

group may be desirable to frame a house. There is no fixed location for a framing tree but such trees placed at approximately 45° from the front corner of the house usually give the most desirable results.

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The Shade Tree

The ideal shade tree for the small home plot is one that gives shade during the hot summer weather and permits sunshine in the winter, therefore the deciduous trees are superior to the evergreens. Where only partial shade is desired, the weeping birch, Kentucky coffee tree or honey locust is ideal. For more dense shade the little-leaf linden, catalpa, Norway maple and Carolina poplar are desirable. Unless you object to slow growth, hard maple, red oak, hackberry, horse chestnut and black walnut should be given strong consideration. Do to the brittleness of their wood, the roots filling sewage lines and other undesirable characteristics I would not recommend such fast growing trees as Chinese elm, weeping willow or Lombardy poplar.

The Screening Tree

Screening trees are usually planted on the rear and sometimes on the side property lines. The purpose of such trees is to enclose the outdoor living room, to insure privacy and to exclude from view undesirable features in the neighborhood. Screening trees may also supply a desirable background for lawn and flowers.

Since nearly all overhead utility lines are located on the back alley or back property line, care must be exercised in selecting the proper type of tree for screening. High trees interfere with these overhead utility lines and the needed trimming, even when done by experts, destroys the natural growth and beauty of the tree. For this reason, screening trees should be of the low variety such as Russian olives, various crab apples, fruit trees or hawthorns. Evergreen hedges are very effective if kept closely trimmed.



A tree improperly placed and not of the proper variety has its natural beauty destroyed by pruning.

In general, most ornamental trees are suitable for screening purposes. In the one-story home areas various types of shrubbery should not be overlooked as borders and backgrounds for the outdoor living room.

The Ornamental Tree

When we think of ornamental trees we usually think of blossoms, fruits and colored foliage. In some varieties we get all three of these additions to the beauty of the home. This is especially true of the Dolgo and Hopa crab apples and the white and scarlet hawthorns. In other varieties such as sumac, Russian olive, golden rain tree, golden honey locust, Schwedler maple and red oak we get only the beautiful foliage. The weeping birch is sometimes classed as an ornamental tree. The mountain ash, due to its colored fruit, is often effectively used.

In considering ornamental trees, the various types of evergreens should not

*Watch for the 1964 edition of the
Denver Botanic Garden's Calendar*

be overlooked. The blue spruce may be too domineering on the average small plot of land but other evergreen trees may be effective for ornamental screening and framing purposes. Evergreen trees, due to the intense shade they create, are usually used in the front yards. This intense shade is not desirable in the back yard as this is where we usually plant our gardens.

In closing, I would like to call the readers attention to the large variety of beautiful crab apple and prunus trees in the Denver Botanic Gardens City Park Unit which is located near the Museum of Natural History in Denver City Park. It will be a real treat for you to visit this area during the spring blossoming season.



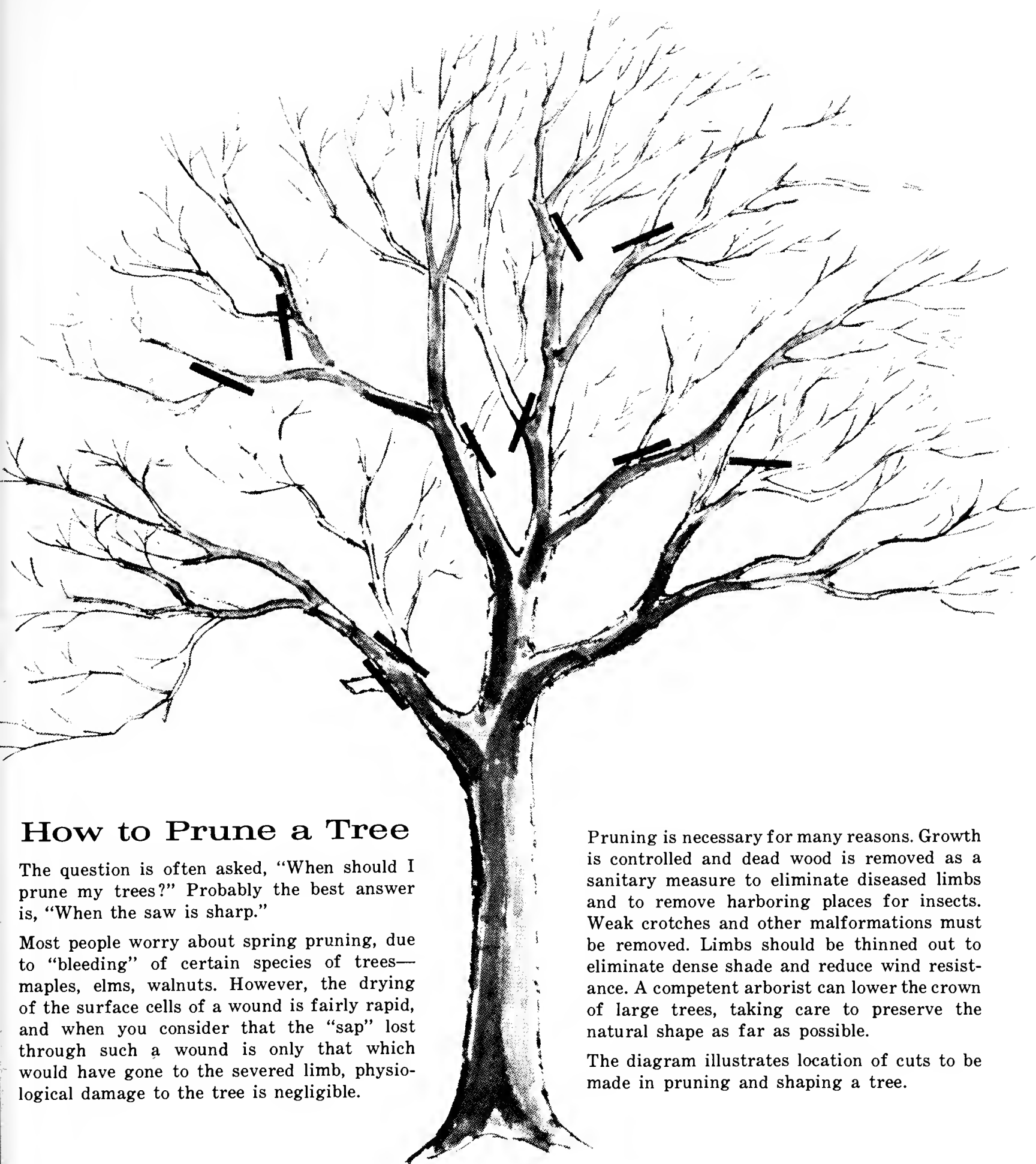
American elms are trees that grow too high for clearance of utility lines.

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How to Prune a Tree

The question is often asked, "When should I prune my trees?" Probably the best answer is, "When the saw is sharp."

Most people worry about spring pruning, due to "bleeding" of certain species of trees—maples, elms, walnuts. However, the drying of the surface cells of a wound is fairly rapid, and when you consider that the "sap" lost through such a wound is only that which would have gone to the severed limb, physiological damage to the tree is negligible.

Pruning is necessary for many reasons. Growth is controlled and dead wood is removed as a sanitary measure to eliminate diseased limbs and to remove harboring places for insects. Weak crotches and other malformations must be removed. Limbs should be thinned out to eliminate dense shade and reduce wind resistance. A competent arborist can lower the crown of large trees, taking care to preserve the natural shape as far as possible.

The diagram illustrates location of cuts to be made in pruning and shaping a tree.

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CHARLES M. DRAGE

Extension Horticulturist, Colorado State University, Fort Collins

THE ZOYSIA GRASSES (*Zoysia matrella*, *Z. japonica* and *Z. tenuifolia* and selections) are also called Japanese lawn grass, Manila grass or Mascarene grass. Meyer Z-52, also called Amazoy, is a selection from *Z. japonica* made by the U. S. Department of Agriculture. Meyer is a more hardy selection better adapted to northern areas. It is propagated by sprigs or sod pieces. Zoysia grasses are southern or warm weather grasses. The rhizomes and stolons produce a tight, very resilient sod. They are slow growing but rugged. They are adapted to full sun or partial shade. Where they are well adapted it takes two or three years for complete coverage. They do require feedings, water and mowing.

In 1953, Mr. George Beach, Professor of Horticulture, Colorado State University, Fort Collins, secured a flat of Meyer Z-52 zoysia from the U. S. Department of Agriculture Research Station, Beltsville, Maryland. The

zoysia was propagated in the horticultural greenhouses and transplanted to the turf-grass variety plots on the campus in the spring of 1954. Greenhouse propagation was continued and a relatively large area was transplanted to the Botany Department acreage in cooperation with Dr. Jess Fults in the spring of 1954. In 1955, test plantings were established in Denver and Pueblo. In 1957, additional test plantings were established in cooperation with Colorado State University extension agents in Durango, Glenwood Springs, Grand Junction, Las Animas and Rangely. Sod pieces were also provided the Colorado State Highway Department and the management of Bears Stadium in Denver for testing. During this time transplantings were made to numerous locations in Fort Collins. In most instances plugs approximately four inches square were planted one foot apart in rows one foot apart.

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All tests indicated that the zoysia was hardy and it continued to spread in the first planting made in 1954. At Pueblo, zoysia started to green in late April and in Fort Collins in mid-May. It turns yellow after the first frost in the fall so provides a green cover for only a short time. Due to the short growing season in Colorado the grass requires several years to form a complete cover when rather large sod pieces were used. The people who are acquainted with the grass feel that it would be extremely difficult to establish a solid cover of grass when the

small plugs or sprigs, which are available, are transplanted. Also, that it would not be advisable to insert these small sprigs in established bluegrass.

Because the area occupied by zoysia on the Botany acreage was needed for other uses and because further testing was not felt necessary, the acreage was plowed under in the spring of 1960. Before this was done extensive plantings were made at Bears Stadium and by the State Highway Department in the Denver area. These plantings were made in areas where it would be difficult to manage bluegrass.

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? ? ? ? ?

Pete

Ponders

? ? ? ? ?

Dear Pete,

The article "Birds in Your Winter Garden" (*The Green Thumb*, Dec., 1962) was enjoyed by our whole family but it has created some questions or problems which I hope you can answer for us.

First of all, we purchased some suet, rendered it and poured it into old cups and then poured in wild bird seed. When the suet had set and become firm we removed the half balls from the cups, pressed two together to make a nice suet ball, solid with seed all through.

We have attracted four kinds of birds — sparrows, which have not stayed long and don't seem to care much for our menu, juncos, which are just darling and the ones we would like to encourage more, another large bird whose name we have not been able to locate (he is approximately the size of a magpie only with a short tail, has a rather long beak, is brownish in color with a bit of orange-rust on his lower side feathers, is speckled all over on top of this and has a very distinctive dark-colored crescent on his breast) and, last but not least, starlings!

Our question: Could you identify for us the bird with the dark crescent on his breast? He is very nice and we would like to have him come more



often. Our problem: We find the starlings quite obnoxious. They not only scare away the other birds but fight fiercely among themselves for a choice spot at the banquet table. We would like to discourage the starlings from coming, not only because of their poor manners but also because we understand they ruin fruit on the trees and we live in an old apple orchard that still boasts eleven fruit-bearing trees.

Thank you for a most wonderful publication and for any information you can give us on the above questions.

C. D. BIRD

Dear Birdie,

Please excuse our delay in answering your letter but this issue seems more timely. Polly Steele, author of "Birds



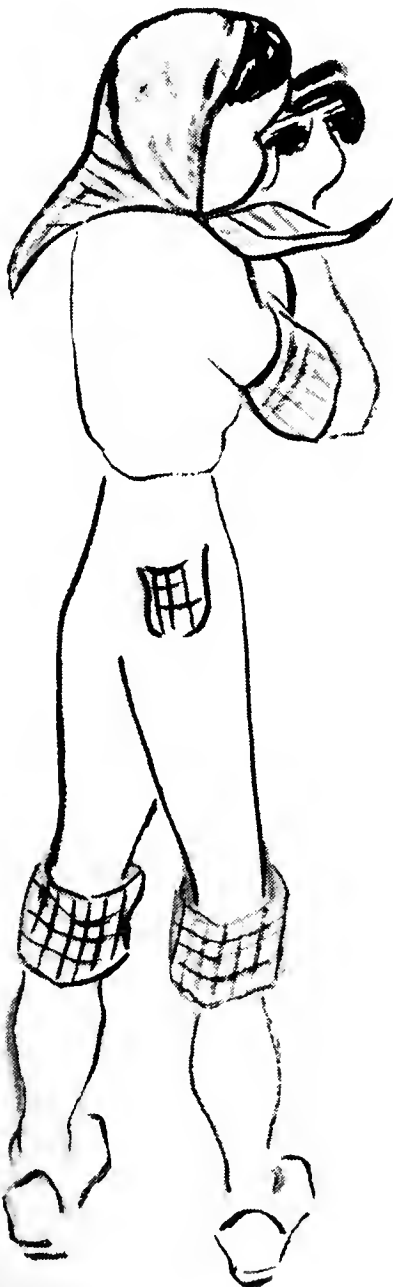
FLICKER

in Your Winter Garden" and illustrator of this column, believes your unidentified bird is an immature flicker and depicts him for you. Suet he likes!

As for discouraging starlings I've pondered that problem for myself. One suggestion is to wave them away whenever they appear at the feeding station. I've done this until I look like a "waving maniac."

You might select your dinner guests by controlling your menu. Mr. J. A. Neff of the Federal Wildlife Research Center suggests eliminating bread crumbs and suet from your banquet table. However, suet attracts many desirable birds. Bread crumbs, he warns, attract many undesirable birds including starlings. Starlings dislike grain so a bird seed diet is unattractive to them.

Although effective controls are still being sought the following are home remedies which might be helpful: dangle colored streamers in the area, glitter bangs — strips of heavy aluminum foil or tin — tied together with a string will tinkle and glitter to discourage birds. Mr. Neff also cited a family which tied an old cowbell into a tree with a rope and each time a member of the family passed the rope, when intruders were present, he yanked the rope. This



might be discouraging to your neighbors. If you live in the country discharging fireworks or firearms is a deterrent.

Considered "dirty birds," starlings are voracious meat eaters and consume huge quantities of cutworms, grubs and grasshoppers. While they severely damage grape vineyards, cherry and peach orchards, in our area they seem to be of insufficient numbers to inflict exten-

sive damage to apple trees — at least when I have apples, everyone has apples and giving them away is difficult.

Mr. Neff does warn that grackles, similar in appearance to starlings but possessing a larger beak and distinctive iridescence, are extremely destructive. They actually kill other birds and will toss eggs out of others' nests.

Keep the mail coming and happy birding!

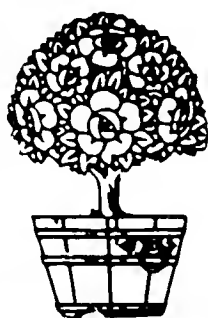
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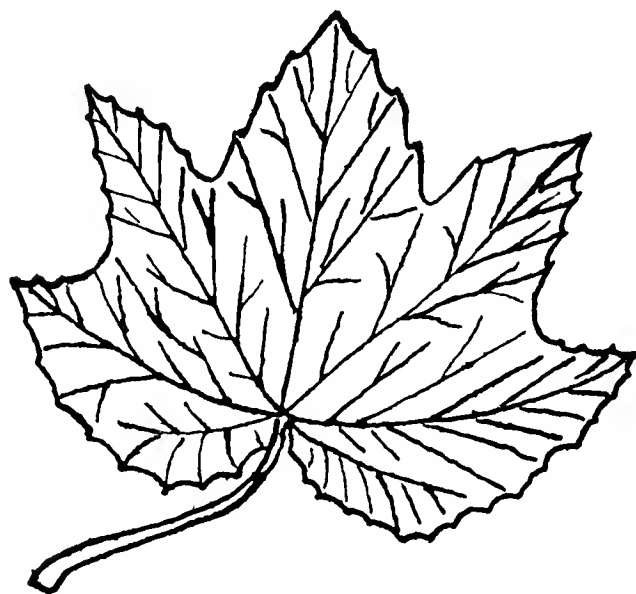
What's In A NAME

JOSEPH W. OPPE

The genus *Acer* (maple) is a cosmopolitan group with representative species in Africa, central and eastern Asia, Europe and North America. There are over 100 species of maple, many of which are grown for shade and ornamental purposes.

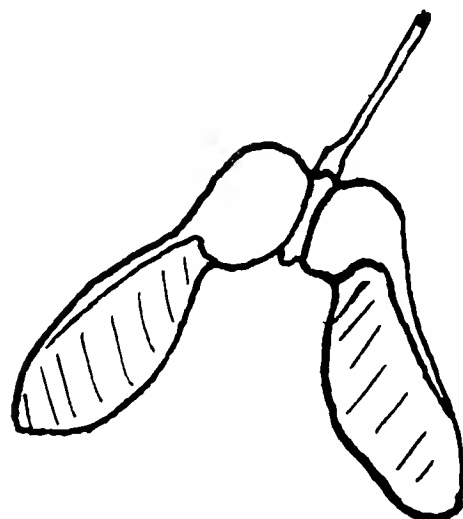
The generic name for the maples was derived from the Latin *acer* (hard or sharp). This may possibly refer to the sharp-pointed lobes of the typical maple leaf.

Two of the maples commonly grown in the Denver area have specific names which are very similar in origin, pronunciation and spelling. They are *Acer saccharum* (the hard or sugar maple) and *A. saccharinum* (the soft or silver maple). Both words were derived from the Latin *saccharum* (sugar) which refers to the high sugar content of their sap.



Colorado has three native species of maples, *Acer negundo*, *A. grandidentatum* and *A. glabrum*. There seems to be no definition for the word *negundo*. The coarse, blunt teeth of *A. grandidentatum* accounts for its specific name. *Acer glabrum* was given a specific name which corresponds with the hairless condition of its leaves. The Latin word for smooth is *glaber*.

Specific names based on geographical distribution are common among the maples. *Acer japonica* and *A. nipponicum* are both native only to Japan. The striped maple or moosewood (*A. pennsylvanicum*) grows natively in much of the northeast United States. *Acer orientale* is, as its specific name infers, native to the eastern Mediterranean area.



There are numerous famous persons who have had maples named in their honor. *Acer dieckii* was named for George Dieck (1847 to 1925), a German horticulturist. *Acer henryi*, a native of central China, was thus named by the German Ferdinand Pax (1858 to 1942) in honor of Augustine Henry (1857 to 1930), an Irish dendrologist (dendrology being the study of trees) and collector of Chinese plants. *Acer hookeri* was named in honor of Sir William Jackson Hooker (1785 to 1865) who, in 1841, became director of the Royal Botanic Garden at Kew.

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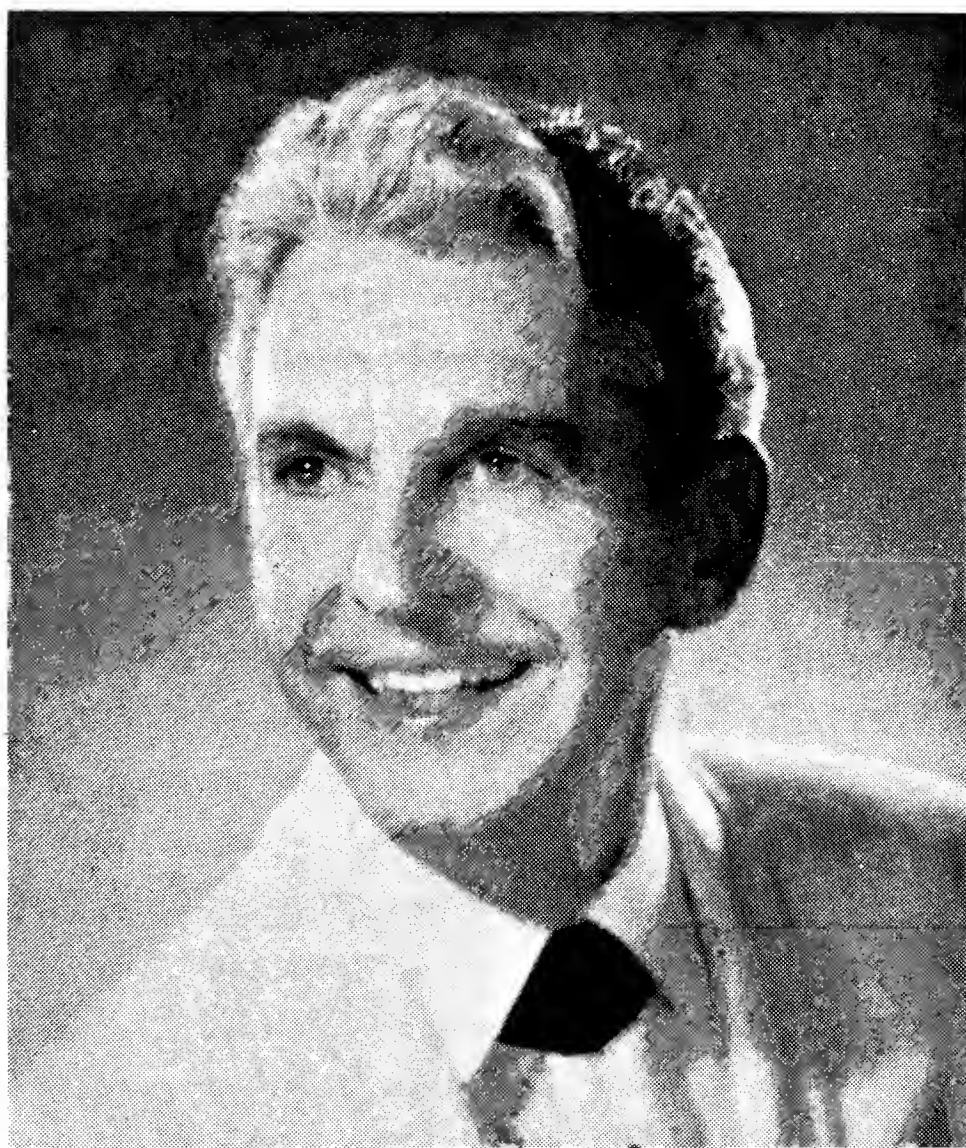
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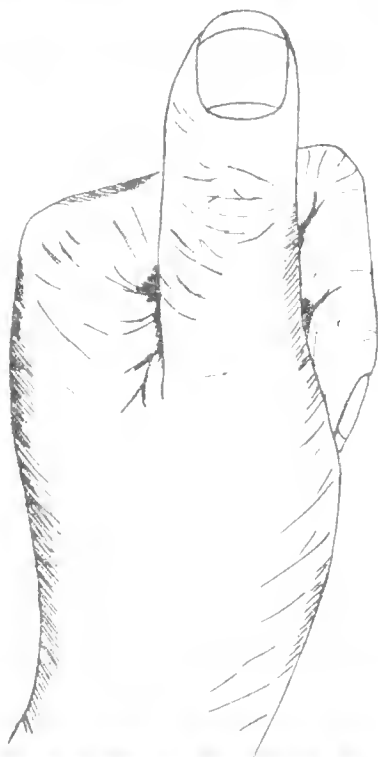
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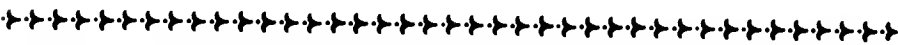
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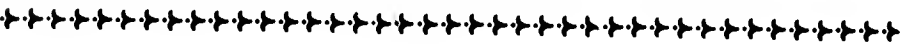
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THE COVER

Bearberry or kinnikinnick (*Arctostaphylos uva-ursi*).
Original drawing from the Emma A. Ervin Collec-
tion.



In Memoriam

FRED R. JOHNSON

LEN SHOEMAKER

FRED R. JOHNSON was born at Mt. Carmel, Pennsylvania, January 19, 1886. After completing high school he attended Dickinson College at Carlisle, Pennsylvania and was graduated in 1909. In 1911, he received his degree of Master of Forestry from the Yale University School of Forestry.

Soon afterward, he found employment in the United States Forest Service and began work in that Bureau July 1, 1911, as a Forest Examiner on the Arapaho National Forest, west of Denver. On March 1, 1912, he was transferred to the Nebraska National Forest, where he became Forest Supervisor.

After gaining four years of nursery and tree planting experience at Bessie Nursery on the Nebraska National Forest he was brought into the Denver Regional (then District) Office on August 1, 1916 and placed in charge of that work in the Rocky Mountain Region or R-2, as it is usually called.

On June 15, 1918, he married Rosalie Shields and to their union two daughters, Marjorie and Louise, were born.

In 1929 Fred was transferred to the branch of Recreation and Lands in the Denver Office where he handled the recreational and publicity work of the Region and in 1937 he was promoted to the rank of Chief of Information and Education, a new branch office, just established.

In his new assignment, he did a good job of public relations work and

was rewarded for his efforts by being promoted, on July 14, 1946 to the rank of Assistant Regional Forester. In that capacity he handled the informational and educational affairs of the Rocky Mountain Region until the end of the year 1950. On December 31 of that year he retired, after having served the government for over 39½ years.

During his tenure of office in Denver he had many outside interests and activities. During the late 1930's and the early 1940's he was an active member of the Colorado State Forestry Association, which, partly through his efforts, became the Colorado Forestry and Horticulture Association in 1944. He, Walter Pesman and others put out the first copy of *The Green Thumb* magazine in February of that year. In each of those organizations he held official positions and labored diligently in their activities. He was also a member of the Professional Society of American Foresters and sometimes attended their annual meetings.

He was on the Board of the Denver Area Council of Camp Fire Girls, a member and secretary of the Colorado Engineering Council and a member of the City Club. To each he gave much assistance.

Fraternally he belonged to Park Hill Lodge No. 148, A. F. & A. M. and to Colorado Consistory No. 1 and engaged actively in their meetings.

Our personal friendship began in 1922 when he came to the Aspen

District of the Holy Cross National Forest to inspect my tree planting areas. We met occasionally over the years but did not know each other well until I was assigned as his assistant in Information and Education on August 1, 1938. We then worked together for over five years and our acquaintanceship ripened into a deep and lasting friendship. After I retired in 1943 we continued our friendly relations and visited each other frequently. On those occasions we had fun as we cussed and discussed the good old U. S. Forest Service and revived recollections of former days.

After he retired he gave much time and effort to the Colorado Forestry and Horticulture Association and to Denver Botanic Gardens, which re-

placed it. At the time of his death he was a member of the Botanic Gardens' Board of Trustees, Historian, Chairman of the Library Committee and a member of the Editorial Committee of *The Green Thumb* and usually lent a hand wherever it was needed.

Other activities after his retirement included being a member of the Advisory Council, Colorado State Park and Recreation Board and in assisting the Colorado State Board of Land Commissioners in giving his views on the management of the Colorado State Forest in Jackson County.

His wife Rosalie passed away in May, 1962 and he died September 30, 1963. Both are buried in Fairmount Cemetery. Their daughters reside in California.



In Retrospect

LAWRENCE A. LONG

FRED JOHNSON was one person but he performed the work of many with a rare devotion to accomplishment we seldom encounter. When he passed away, his friends at Denver Botanic Gardens, amongst the many he acquired during his busy life, realized with consternation how many gaps he left in our organization.

Fred, in his quiet, sincere way, accepted the responsibilities thrust upon him because he wanted to be of service to the community in which he lived and to the people who were his friends and associates. He was not a glory-seeker—his desire to be helpful was a part of his way of living imbued in him from his early years—the years of struggle to gain a firm foothold in the U. S. Forest Service. I would like to quote from a letter received from one

of his colleagues upon learning of Fred's death. Myron W. Thompson, now also retired from the U. S. Forest Service, writes:

"I am sure that I have known Fred longer than anyone else in Denver. We met in the summer of 1909 at summer school on the Pinchot estate at Milford, Pennsylvania. (That estate, including Gray Gables has recently been donated by the Pinchot family to the U. S. Government for research and other activities along conservation lines.) Then, after we received our degree of Master of Forestry and had completed work at the spring camp in Texas in 1911, we reported together to the regional headquarters of the U. S. Forest Service (Central Rocky Mountain Region) at Denver.

"It was necessary that we have

either a B.S. or B.A. degree in order to enter the Forest Service. It was also necessary that we pass the U. S. Civil Service examination in order to receive an appointment. The examination required two days at the New Haven Post Office—and it was *tough!* A total of 150 of us took this examination for Forest Assistant in 1911 and 80 passed. Fifty of those who passed were appointed at a salary of \$1,200 per year and the other 30 received \$1,000 per year! (I modestly mention here that Fred and I received \$1,200 appointments.) Then, when we went to work, we had to buy saddle horses and riding equipment as well as a pack horse and packing and camping gear. I am mentioning these things because some college students think they have a tough time *now!*

“Fred and I spent many years of close association in our work in the U. S. Forest Service. He was always busy with public service activities, particularly with the Colorado Forestry and Horticulture Association and Denver Botanic Gardens. He will be greatly missed by all who knew him.”

As you read this, can you imagine the battle that was fought by these early-day foresters, pioneers, actually, who struggled to preserve our forests, to prevent their depredation and to

replant areas which had been decimated by man and nature? All of this for a sum so paltry it could never compensate for the risks and hardships involved. The character of men like Fred Johnson was molded by his dedication to doing the finest job possible and there emerged eventually the man who retired from the U. S. Forest Service in 1950 as Assistant Regional Forester of the Central Rocky Mountain Region in Denver.

When Fred retired from life, he did so after many years of service to his community. In his association with us at Denver Botanic Gardens, he served as a member of the Board of Trustees and of *The Green Thumb* Editorial Committee, as Chairman of the Library Committee (which is still carrying on with the program he outlined for updating the library) and was our Historian. Every post which he accepted was taken with a sense of responsibility far above average. He was methodical in establishing a program, precise in his records and reports and carried out the requirements of any job with the most assiduous attention to detail. Above all, it was a pleasure to work with him. I am sure he will always remain in your mind, as he will in mine, as a dear friend and as a gentleman whose place with us will never be completely filled.



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MEMBER





Welcome to Botanic Gardens House

HELEN M. VINCENT

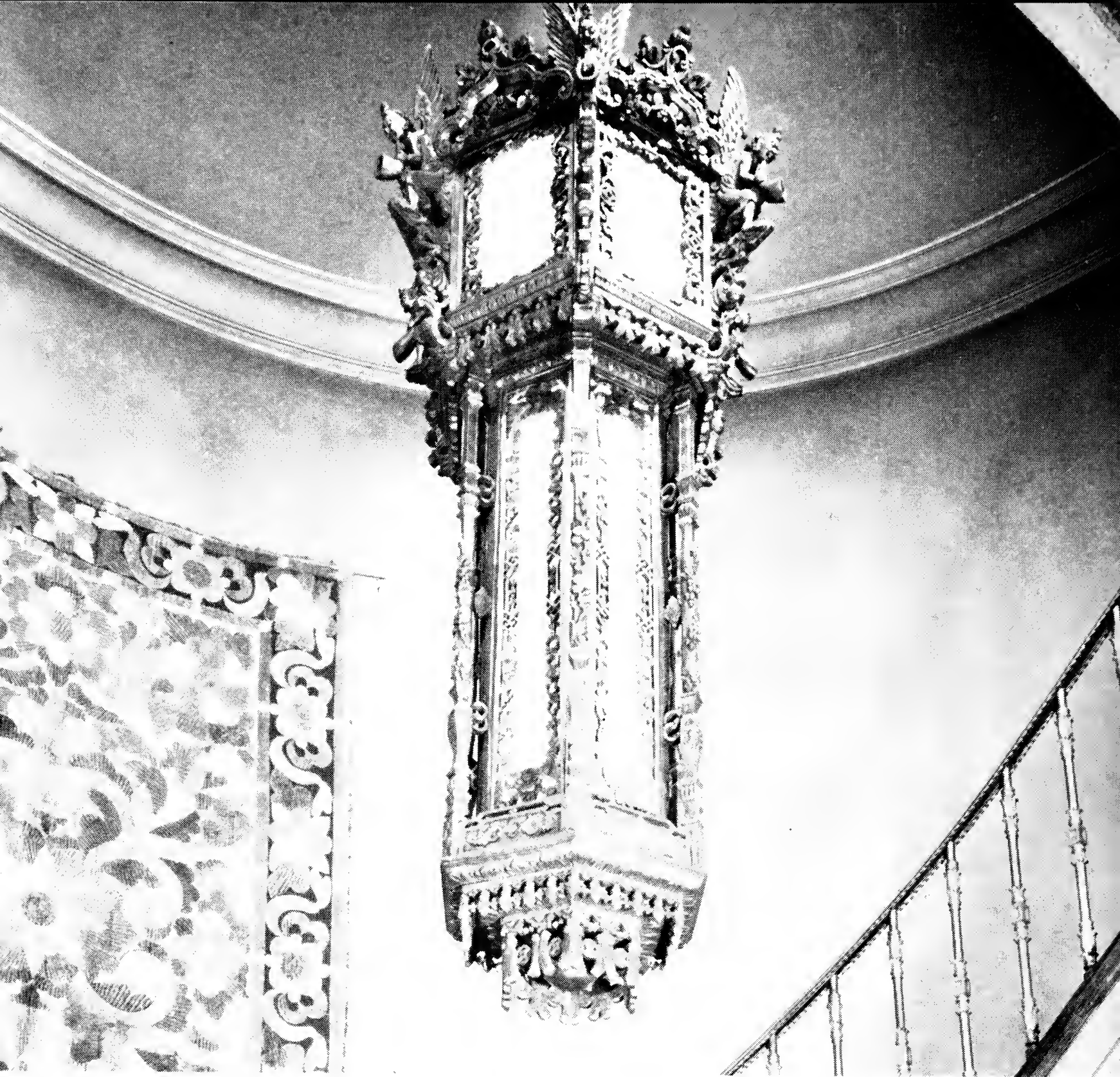
(Editor's note: The photographs illustrating the following article are by Betty Baldwin and were taken from the book, *DENVER DWELLINGS and DESCENDANTS*, by Sally Davis and Betty Baldwin, published by Sage Books.)

DURING THE PAST few years much interest has been shown in Botanic Gardens House which is located at 909 York Street. This House serves as the headquarters and business office for the three units which make up the Denver Botanic Gardens.

The decor remains much the same as when the House was constructed in 1923 for Mr. and Mrs. Richard Crawford Campbell. Mrs. Campbell was the only daughter of Senator Thomas Patterson, who was at one time the owner and publisher of the Rocky Mountain News. Some years later, the House was

purchased by the late Mr. Elmer Hartner, President of Western Seed Company and was occupied by the Hartner family for nearly 30 years. In 1958 it was purchased by Mrs. James J. Waring and given to Denver Botanic Gardens as a nucleus for the great project underway in developing the Gardens. It has been dedicated to the memory of Mrs. Waring's late father, Mr. Henry M. Porter, who was instrumental in the founding of the well-known Porter Hospital in Denver.

You will doubtless admire the artistry evident in the structure of the building and interior decorations as well as some of the lovely old pieces of furniture. Except for some changes necessary to make the offices functional (such as providing more modern lighting) nothing has been done that would detract from the charm that has existed here for so many years. Six of



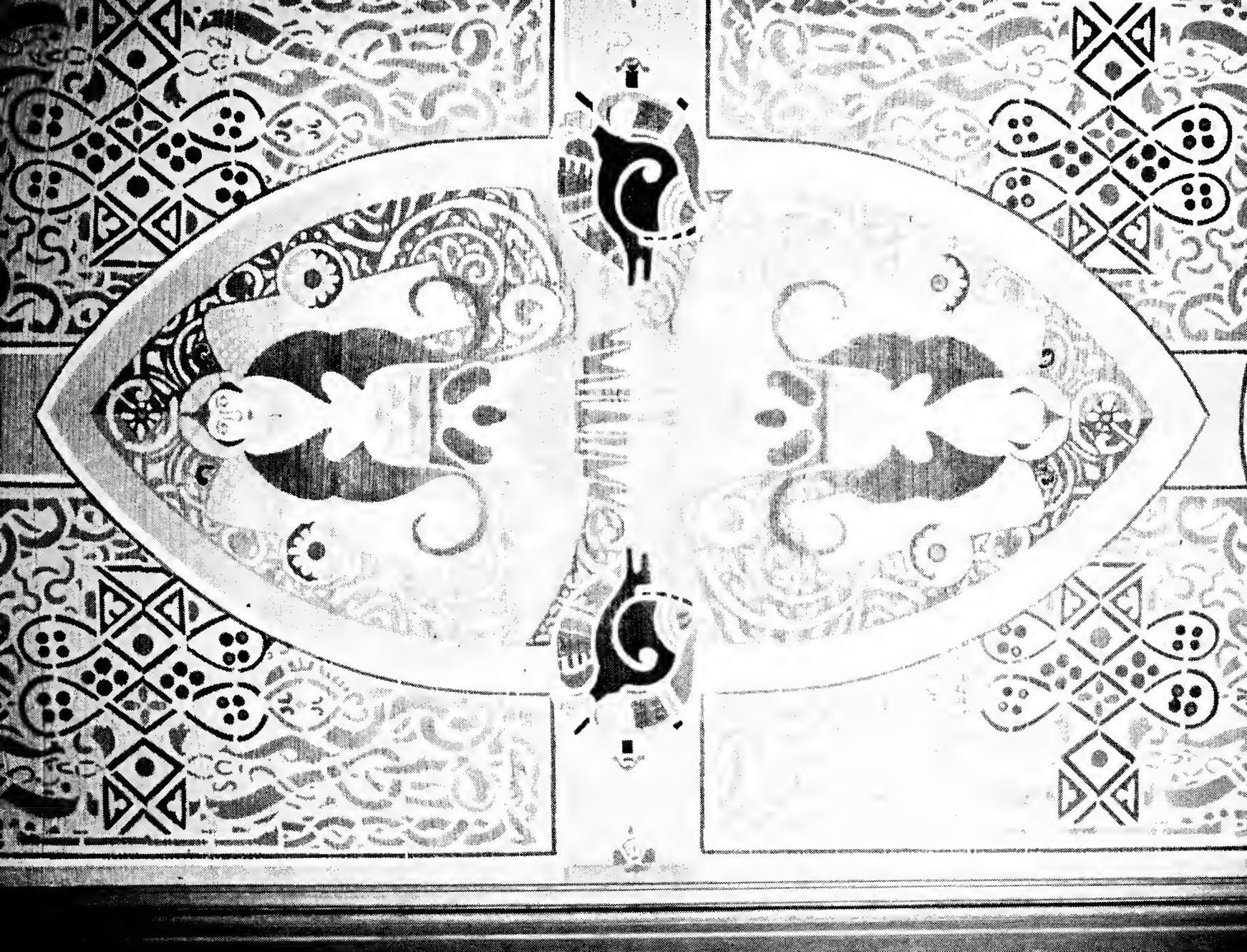
Oriental chandelier adjacent to stair case.

the fourteen rooms have been converted into offices and meeting rooms. The ceilings in the drawing and dining rooms and the arches in the foyer were painted by John Thompson and the building was designed by Jacques Benedict, both considered fine artists of their era and, therefore, much in demand by Denver socialites. The lovely rugs were especially designed for the rooms and much of the furniture and the tapestries were collected by the Campbells and Pattersons on their European travels.

The library, at the time Denver Botanic Gardens acquired the House, contained the extensive Campbell-

Patterson book collection. These books, with the exception of some which were particularly valuable, were sold in box lots and the proceeds given to Denver Botanic Gardens. The Helen K. Fowler Library, containing numerous volumes on horticultural and botanical subjects, is now housed in this library. Members of the Denver Botanic Gardens are invited to check out books and non-members are welcome to use the books in the library.

The Colorado Federation of Garden Clubs, Inc., has its State Garden Center on the second floor and maintains a library and reference room for its members here.



Drawing room ceiling designed and painted by John Thompson.

Also located on the second floor is the Kathryn Kalmbach Herbarium, a collection of nearly 3,000 dried plant specimens, mounted and labeled, which have been collected by members of the Botany Club of Denver, the Colorado Forestry and Horticulture Association, which was a forerunner of Denver Botanic Gardens and many people interested in an herbarium collection. The late Mrs. Kalmbach was largely responsible for the progress made in this work and for the acquisition of many of the specimens.

The Green Thumb magazine, devoted to assisting Rocky Mountain area gardeners and the monthly *Green Thumb Newsletter* are published by Denver Botanic Gardens and sent to approximately 2,100 members. The editor's office is located on the second floor.

There are many luncheons, teas and meetings held here each month for and

by garden clubs. Instructional courses in various fields of horticulture are conducted at appropriate times of the year. Several plant societies hold their monthly meetings here and flower shows are held when the blooms are at their peak.

The City and County of Denver has granted Botanic Gardens the right to use the 18 acres north of the House for the purpose of developing a botanic garden. The City and County partially subsidizes the maintenance of this area. However, a large portion of the funds required to operate the Botanic Gardens and the House comes from civic-minded people and from members of the organization. The House itself is partly maintained by contributions from visitors.

You are welcome to tour the House and please feel free to ask any questions that have not been answered here.

PROGRESS

of the Denver Botanic Gardens in 1963

A. C. HILDRETH

THE YEAR 1963 opened auspiciously for the Denver Botanic Gardens. On January 2, work was begun on the first of our model gardens. This development embodies the three R's of simple construction materials — rocks, reeds and redwood. Plantings include trees, shrubs and ground covers with occasional groups of annuals and perennials for color. The result is a low-

maintenance garden which eventually will have abundant shade and facilities for comfortable outdoor living. Chris Moritz was the designing landscape



A view of the model garden which was dedicated to the gardeners of Denver by Lew Hammer, Inc.



The Gates Memorial Garden, designed by S. R. DeBoer.

architect. This fine gift of Lew Hammer, Inc., was completed in early summer and, on June 30, was formally dedicated to the gardeners of Denver.

Work on the Gates Memorial Garden, which started in the fall of 1961, continued into 1963. Basic construc-

tion and planting reached completion the past spring. Only minor details now remain to be filled in. This gem of informal landscaping has already taken on the aspect of a peaceful mountain scene and this effect will be enhanced by each year's growth of the plantings.

The most significant event in the history of Denver Botanic Gardens occurred on January 7, when the Boettcher Foundation publicly announced the gift of \$600,000 for erection of a conservatory. Previously that Foundation had granted \$10,000 for research and preliminary designs.

Architects Hornbein and White completed the plans early this fall and the contractor, Gerald H. Phipps, Inc., will soon begin construction.

The architects have also completed plans for the remainder of the building complex proposed for Denver Botanic Gardens. Included are plans for Horticulture Hall and for a range of greenhouses.

The Annual Dinner was held on February 20 at the University Club. This gala affair was under the competent direction of Committee Chairman, Mrs. Joyce Arneill. Attending were 231 members and guests. On this occasion President Lawrence A. Long announced a gift, from an anonymous donor, of \$100,000 toward the erection of Horticulture Hall.

Financially, 1963 was our best year. Not only did we receive \$700,000 in gifts for buildings but also a \$15,000 capital improvement allotment from the City and County of Denver. This allotment, made possible by the new sales tax, was used mostly for Horticulture Hall plans.

Our 1963 operating budget from the City and County of Denver, totaling \$59,300, was the largest we have received. Unfortunately, Denver's finan-

cial crisis of late summer forced a reduction of \$3,220, making the revised budget \$56,080. In consequence, we were compelled to lay off all temporary help before the termination dates of their appointments and also to curtail purchases of needed supplies and materials.

Ordinarily, there are three major sources from which Denver Botanic Gardens derive income for activities not covered by the allotment from the City and County of Denver. These are the Garden Tour, the Plant Sale and Auction and membership fees.

This year the Garden Tour had to be called off because a hail storm severely damaged most of the gardens selected for the tour.

The Plant Sale and Auction was held this year on May 11 and 12. This event, under the able direction of Mrs. Robin Long and Mrs. Fran Morrison, was a great success. Returns were \$3,787.16 net.

This year for the first time, Denver Botanic Gardens had a membership drive. This activity was under the capable leadership of Mrs. Giles Filley and Mrs. Mackintosh Brown. The drive officially started May 11 and ended June 7 with a party at Botanic Gardens House for members and for the workers in the drive. This whole program was magnificently organized, well publicized and highly successful. In all, 770 new members were added to the roll during the drive.

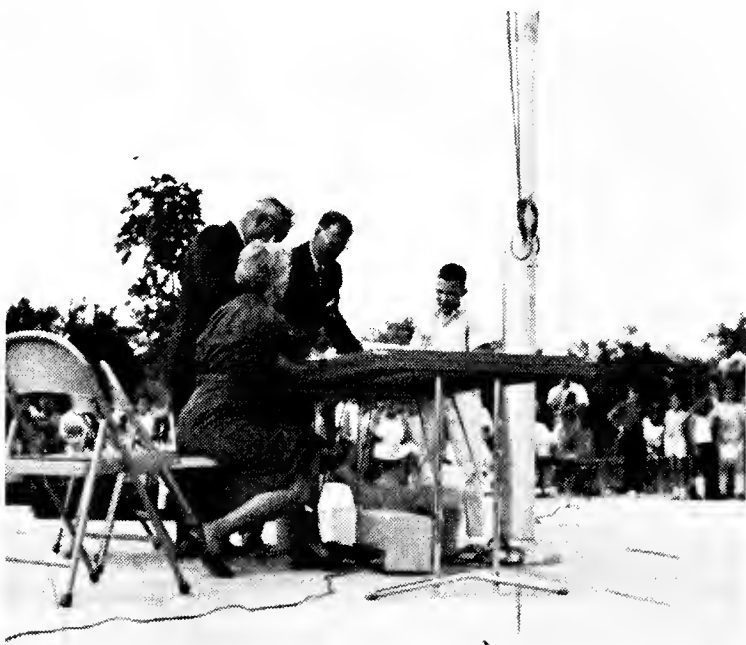
But botanic gardens are more than construction and fund raising. Their chief functions are, of course, education and research.

The Helen Fowler Library, perhaps our most important educational project, made considerable progress this year, thanks to an active library committee under the chairmanship of the late Fred R. Johnson and to the untir-

ing efforts of our volunteer librarian, Mrs. Arthur Hellriegel. Rearrangement of the library material has made it more available to the public. The updating of the library was made possible through the generous financial assistance of Mrs. Alexander L. Barbour.

New books and periodicals have been obtained through gifts and purchases. Most significant of the gifts are the book *Exotica III* from Mr. C. Edgar Adelhelm; the 14 volume *New Illustrated Encyclopedia of Gardening* from Mrs. Elsie Clifford and a handsomely bound set of Luther Burbank's writings from the library of the late Lemoine Bechtold. A fine mahogany book case made and presented to the library by Pat Gallavan relieved to a considerable extent the shortage of shelf space.

This year marked the fourth season for the Children's Garden Program, in



Children's Garden Program graduation ceremonies.

many ways the most successful one. One hundred and three children each grew individual gardens and satisfactorily completed the program. A special feature was the Garden Fair held on graduation day where children exhibited the products of their gardens. Competition for the coveted ribbons was keen. Garden Clean-up day was

inaugurated this year, when the children cleared their plots in preparation for next year's garden season.

A new publication, the *Green Thumb Newsletter*, edited by Mrs. Marilyn Holmes was launched in May. This pithy little reminder to gardeners has been well received by our members. *The Green Thumb* magazine of course continues under the capable editorship of Mr. Joseph W. Oppe. The number of issues was reduced to eight for this year.

The weekly garden column "Down Your Garden Path" written by your Director and published in the Rocky Mountain News during the gardening months, completed its fourth season with the September 28 issue.

Several plant displays in the gardens were of educational value to the visiting public.

The flowering season opened with the blooming of 7,750 tulips representing 155 varieties. These tulips were planted the previous fall in conjunction with the test program being conducted by the Netherlands Flower-Bulb Institute, Inc.

The displays that attracted the most attention this year were the iris plantings in the York Street and City Park Units. The American Iris Society meetings were held in Denver this



Tulips blooming at the York Street Unit.

year, from May 29 to June 1, just in time to catch most of the iris at the peak of bloom. Of special interest was the Official Guest Iris Planting where iris breeders had sent their latest and best creations for display. Nearly 700 Guest Iris were in this planting. About a third of them had not yet been named. After the meeting, most of the exhibitors allowed the Denver Botanic Gardens to keep at least a fan of each plant displayed.

Captain W. R. Wright, for the last two years, has made an interesting and instructive planting of dahlias at the York Street Unit. This year the collection included about 250 plants of a great variety of sizes, colors and forms, properly staked and labeled.



Gladiolus hybrids in bloom at the York Street Unit.

Mr. Lee Ashley provided and planted a colorful display of his gladiolus hybrids.

The rose beds in the City Park Unit were again under the able supervision of Mrs. Vella Conrad. These beds contain over 3,700 roses of 200 varieties. Although the flowers were not of as high quality as those of previous years, due to the dryness of the air and high temperature, they were still admired by thousands of people.

The Colorado Cactophiles, in addition to planting and tending a cactus

garden in the York Street Unit, presented Denver Botanic Gardens with the Eckstein cactus collection. This is at present in the small greenhouse on the grounds and will be one of the attractions in the Conservatory when it is completed.

An extensive labeling system has made the Alpine Unit on Mount Goliath of more value and interest to the public. With the able assistance of Dr. E. H. Brunquist an effort was made to label plants along the trail while they were in bloom. This labeling was carried out during the entire blooming season which normally lasts from May to October.

Very little work of a research nature has been attempted. Additions to the Herbarium this year consisted mainly of specimens collected from the Mount Goliath area. Also, a beginning was made toward building up a collection of specimens of ordinary garden plants. Some progress was made toward developing a card index of all the specimens in the herbarium.

Hardly worthy of the name of research, but still a very necessary service, was the testing and evaluation of annual plants for this area. This test included 193 varieties of common garden annuals including petunia, marigold, calendula, cosmos, celosia, amaranthus, verbena and zinnia. A total of nearly 10,000 plants were in this test. (The entire mass of these flowers made an unforgettable display of color.) Results of these trials will be published as soon as the data can be analyzed.

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Report on The Membership Drive 1963

MRS. MACKINTOSH BROWN *and* MRS. GILES FILLEY

THE PRIMARY PURPOSE of this membership drive was to place Denver Botanic Gardens before the people of the Rocky Mountain area as a center for enjoyment, education and scientific research. In addition, it was hoped that a broader base of membership, with a more widespread representation in the entire region, would stimulate an active interest in both botany and horticulture in the Rocky Mountain area.

The secondary purpose was one of raising funds. Denver Botanic Gardens relies heavily on financial help from projects of this kind to augment the City and County of Denver appropriation. Without these membership drive funds and other types of individual support, Denver Botanic Gardens could not continue to increase its services to the public.

Reviewing briefly, you may remember that early this year the Boettcher Foundation granted \$600,000 for the construction of a Conservatory at the York Street Unit of Botanic Gardens. An anonymous gift of \$100,000 also was given toward building Horticulture Hall on the same site. The fabulous capital improvements thus made possible by these two recent gifts placed Denver Botanic Gardens before the people as an expanding organization. It was felt that the public would endorse these gifts by supporting a membership campaign.

Our diligent workers—over 100 of them—were urged on to their fine efforts by 14 “captains”: Mrs. James Arneill, Mrs. Harry Berman, Mrs. Richard Boyle, Mrs. Peter Burnett, Mrs. Adolph Coors, Mrs. John Falkenberg, Mrs. Robert Grover, Mrs. James Hill, Mrs. Ed Honnen, Mrs. William C. Jackson, Mrs. Lawrence Jump, Mrs. Frank Kemp, Mrs. Willard Peck and Mrs. Richard Wilson. Each worker was asked to sell a minimum of five new memberships.

In an effort to reach interested people throughout the state, 120 letters and membership blanks were sent to Federated Garden Club presidents. In addition, 88 letters were sent to out-of-town members of Denver Botanic Gardens asking them to join us in helping to sell memberships in their local communities.

Extensive publicity was arranged by Mrs. Hardin Holmes in conjunction with Denver Botanic Gardens' public relations consultants who received excellent cooperation from radio, television and the local press throughout the campaign. Mrs. Holmes also completed plans for the *Green Thumb Newsletter* to be sent once a month to all members. The first issue was published in May, coinciding with the membership drive. These newsletters

contain current gardening memoranda for the Rocky Mountain region, as well as the latest activities, projects and research at Botanic Gardens. Another innovation is a membership roster which will be published in *The Green Thumb* magazine early in 1964.

The drive officially opened on May 11, the first day of the Plant Sale and Auction, where memberships were sold at a booth. The American Iris Society convention was held in Denver May 29 - June 1. The spectacular display of iris specimens during the time of the drive drew large crowds thus increasing the sale of memberships. The final event of the drive was a party for old and new members and workers at Botanic Gardens House on May 30. The drive was extended one week, at the end of which time 770 new memberships were tallied.

Mrs. John Irving sold the largest number of memberships —25— winning first prize. D-58-30, one of Dr.

John Durrance's beautiful blue irises, now bears her name and is thus known as the 'Harriet Irving' iris. Dr. Durrance also graciously supplied the iris rhizomes which served as prizes for the above-mentioned "captains" and the following workers who brought in 10 or more memberships: Mrs. Brown Cannon, Mrs. Frederic Conover, Mrs. Robert L. Davis, Mrs. M. P. Drummond, Mrs. Edwin Levy, Mrs. Oscar Malo and Mrs. Frederic Pannebaker.

We want to thank everyone who participated in the Botanic Gardens membership drive. Pleased as we are at topping the goal of 750 new members, we feel that an additional uncounted number of people were made aware of the existence of Denver Botanic Gardens through the worker's efforts. Finally, we feel that the benefits of a large membership are immeasurable; they provide moral as well as actual support in every phase of this institutions' activities.

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The Gates Memorial Garden

S. R. DEBOER

(Editor's note. Mr. DeBoer, designer of the Charles C. Gates Memorial Garden, gives some reactions and reflections concerning this fine bit of mountain landscaping just two years after construction work was started.)

THE CHARLES C. GATES Memorial Garden, a gift of the Gates Family to Denver Botanic Gardens, is located at the west end of the York Street Unit. After struggling through the raw developmental stage, through which all new landscape projects must pass, this one is now taking on its intended characteristics of a mountain scene.

On looking at this garden recently, I had to rub my eyes. For here, reproduced in rock, water and plants was the image I had dreamed of.

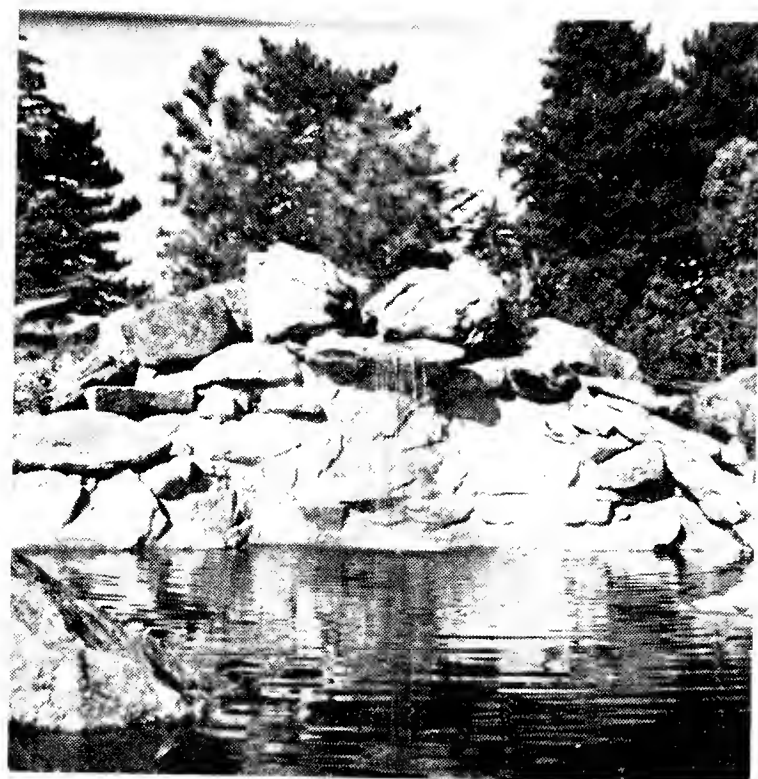
During the planning period I had been afraid that I might not have a design of sufficient size to do justice to Charles Cassius Gates, who perhaps was as important in the life and growth of Denver as any other person. On his intellect, vision and leadership depended the livelihood of thousands of people.

I was fond of this man. In designing his Bear Creek garden I tried out several of my ideas and was rewarded by hearing him many times express the joy

he got out of its tiny streams and its beautiful big trees. Would my plan for his memorial be adequate for a man of his stature?

And now, here is a charming little lake, a massive rock cliff and native mountain plants, handsomely combined and displayed on the plains! The reflection of the rocks in the water is perfect. The waterfall is attractive and the little creek, which winds its way to the lower pool, fits the contour of the land. This stream is not as long as the one in the Bear Creek Canyon garden, but it and the other features will serve to remind us of Mr. Gates' love for such scenes.





The problems that arose in the construction of this mountain landscape were many. The great granite rocks which came from the South Park ranch of Jack Heifel were carefully handled to keep from scratching them. It was quite disheartening when thoughtless workmen plastered their lichen-covered surfaces with concrete in a large section of the cliff. However, time and nature heal all and even this damage is not now very conspicuous.

The shore line of the pool was not planned to show as much exposed concrete as it does. Instead, the grass sod

was intended to come down to the water line. No doubt, weathering of the concrete and growth of algae over it will eventually mask this defect from sight.

Hardly any of the plants were lost in the transplanting process. This, I feel, is a compliment to the men who planted them and to those who maintain them. Although these trees and shrubs have done exceptionally well, they still represent only a skeleton planting. The plants now present were designed to serve as a background for the interesting plant associations called

for on the original plan. Much additional planting and the installation of some special features will be necessary before the garden can be considered completed.

Behind the rock cliff is an interesting little valley intended as a walkway, with a display of mountain plants on both sides. This planting is now taking shape but additional plants are needed to lend it character.

The big tree which I intended to have



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in the foreground-is not yet planted. I had in mind a large shade tree under which a bust of Mr. Gates could be placed, together with an ornamental seat. Still to be constructed, also, is the lookout point, where an overall view of the garden is possible. These details can easily be filled in, now that the foundation work is completed.

I earnestly hope and believe that the end result of all this planning and labor will be a fitting memorial to Charles Cassius Gates and an inspiration to all who are privileged to see it.

A Denver Botanic Gardens membership
makes the ideal Christmas gift.

Flowers

FOR THE YEAR

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THIS LIST encompasses most of the woody trees, shrubs and vines which are commonly grown in Colorado. It also includes those species which are sometimes offered for sale here but which are not adaptable to our peculiar climate.

This rating of the average chances of survival and desirability of plants for Colorado first appeared in the July, 1953 edition of *The Green Thumb*. This first edition was compiled by representatives of the Horticulture Department of Colorado State University, the Extension Department of Colorado State University, the Denver City Forester's Office, the Denver Parks Department, the Denver County Agent, the Colorado Nurserymen's Association, the Denver Landscape Architects, the State Entomologist's Office and the Colorado Forestry and Horticulture Association.

The revision, which appears on the following pages, was made by the Swingle Study Group and the Denver Botanic Gardens.

An attempt has been made to adapt the nomenclature to comply with the standards set forth in the 1958 edition of the *International Code of Nomenclature for Cultivated Plants*. The general scientific terminology was adapted from the second edition of Alfred

Rehder's *Manual of Cultivated Trees and Shrubs*. The nomenclature for the genus *Malus* was taken from Arie F. denBoer's *Ornamental Crab Apples*, while that of the Coniferales come from L. H. Bailey's *The Cultivated Conifers*. The terminology for *Cornus*, *Forsythia*, *Chaenomeles*, *Syringa* and *Gleditsia* was adapted from the registration lists which have appeared, at various times, in *Arnoldia*.

The plants are listed alphabetically by their scientific (botanic) names. An index to the common names is also given for those persons who are not familiar with the Latin terminology.

KEY

All CAPITAL letters refer primarily to hardiness. A rating of "A" indicates a plant that is ordinarily hardy in the Denver area in sites where the wind and sun have full sweep. "B" indicates a plant more susceptible to injury, the result of natural conditions of soil and weather. "B" plants might be classified as "A" plants when planted in more protected locations. "F" indicates that 10 to 20 percent of the plants may be expected to survive under normal exposure in the Denver area. "Z" indicates that one or two percent of the plants may survive in protected loca-

tions only. "A protected location" is usually an area to the north or east of a structure or other plant or group of plants. The "protected location" may be further enhanced when conditions of air and water drainage are ideal and "frost pockets" have been avoided.

The term chlorosis, when used in the text, refers to the yellowish discoloration of foliage caused by iron deficiency.

Small letters refer to desirability for planting rather than hardiness; "a" for good, "b" a little less desirable, "f" for poor and "z" for no good. "m" indicates plants most likely to succeed at the higher altitudes and "p" those most likely to succeed under plains conditions. Native plants are marked with an "*."

In cases where none of the species of a genus is hardy, the species names are eliminated and the entire genus is

given a "Z" hardiness rating. For example, as far as is known, none of the species of *Abelia* is hardy so none is listed and the genus is given a "Z" hardiness rating.

In some cases, so little information is available that it is impossible to list species. This is true in genera such as *Carya* where the lack of fruits makes it impossible to carry out a positive identification. In such cases, the entire genus is given an "F" rating, until more accurate identifications can be made.

EXAMPLE: *Acer negundo* (box elder) is very hardy but is not desirable where better trees will grow so it is marked — *A, f, m, p. The "*" indicates that it is native, "A" that it is hardy and "f" that it is of poor quality. "m" and "p" indicate that it is adapted to the mountains and plains where better trees might be more difficult to grow.



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(Continued on page 288)

THE 1963

Children's Garden Program

A. C. HILDRETH

THE FOURTH YEAR of the Children's Garden Program of Denver Botanic Gardens has been completed. It ended officially on October 19, when the young gardeners made the final harvest of their plots and cleaned up the debris. This left the ground ready to plow for next year's gardens. A pumpkin for a Jack-o-lantern was given to each child who engaged in Clean-up Day activities.

Previously, on the afternoon of September 14, there were graduation exercises for all these youngsters. Mr. Lawrence A. Long gave the graduation address. Certificates were given to all who satisfactorily completed the program for this year. In addition a handy plastic garden bucket was presented to each, through the generosity of Mrs. Frank McLister. Appropriate prizes were awarded for the outstanding gardens. After the formalities, cookies and soft drinks were served in the garden.

For the beginning gardeners, first prize went to Tia Kawakami, second prize to Paul Conrad and third prize to Rick Hirst. Woody Argall, Jack Conrad and Mary Habas received honorable mention.

For the advanced gardeners (those who had participated one or more years previously in the Children's Garden Program), first prize went to Tim Patrick, second prize to Judy Eha and third prize to Toby Layden. Kent Lupberger and Anna Lane received honorable mention.

A new feature of the program this

year was a Garden Fair, held the morning of September 14, at which the children showed products of their garden plots in competition. An interesting class of exhibits was the contest for the most original creation made from various flowers and vegetables grown in the exhibitor's plot. Some fine artistry and humor were displayed in these creations. There were also some frightening monsters which lent an atmosphere of horror to this part of the show. Ribbons were awarded for outstanding exhibits in each class.

The Garden Fair exhibits were left on display until after the graduation exercises and all visitors were delighted with the excellence of the exhibits and the originality which the children showed in preparing their "special creations."

Winners in the different classes of entries at the Garden Fair were as follows:

FLOWERS

- Aster: (1) Robin Hirst.
- Petunia: (1) Patti Costello.
- Marigold: (1) Joe Craighead, (2) Jorita Reynolds, (3) Rick Hirst, (Honorable Mention) Patrice Sevier.
- Zinnia: (1) Cathy Coyte, (2) Kathy Falkenberg, (3) Elaine Bender.
- Mixed Bouquet: (1) Dorothy Falkenberg, (2) Christine McDonald, (3) Paul Turner.

VEGETABLES

- Acorn Squash: (1) Allison Eha, (2) Joan Kenney, (3) Leona Reynolds.
- Beans: (1) Paul Craighead, (2) Matthew Reynolds, (3) Rick Hirst.

Beets: (1) David Turner, (2) Matthew Reynolds, (3) Billy Schaetzel.
 Broccoli: (1) Philip Martin.
 Carrots: (1) Tim Patrick, (2) John Falkenberg, (3) Philip Martin.
 Cauliflower: (1) Tom Craighead.
 Corn: (1) Paul Conrad, (2) David Lupberger.
 Cucumber: (1) Toby Layden, (2) Judy Eha, (3) Bonnie Goldstein.
 Eggplant: (1) Toby Layden, (2) Jack Conrad, (3) Joyce Einarsen.
 Lettuce: (2) Toby Layden.
 Pepper: (1) Bob Zishka, (2) Pam Patrick, (3) Kathy Falkenberg.
 Summer Squash (Zucchini): (1) John Hine, (2) Paul Conrad, (3) John Danahey.
 Summer Squash (Yellow): (1) Michelle Frawley, (2) Bob Zishka, (3) Bonnie Goldstein.
 Swiss Chard: (1) Judy Eha, Jill Thelan, (2) Judy Moll, (3) George Coyte.

Tomato (large): (1) Philip Martin, (2) Mary Habas, (3) Dorothy Falkenberg.

Tomato (cherry): (1) Kent Lupberger, (2) Leona Reynolds, (3) Dorothy Falkenberg.

Tomato (pear): (1) Jack Conrad, (2) Paul Conrad, (3) Bob Price.

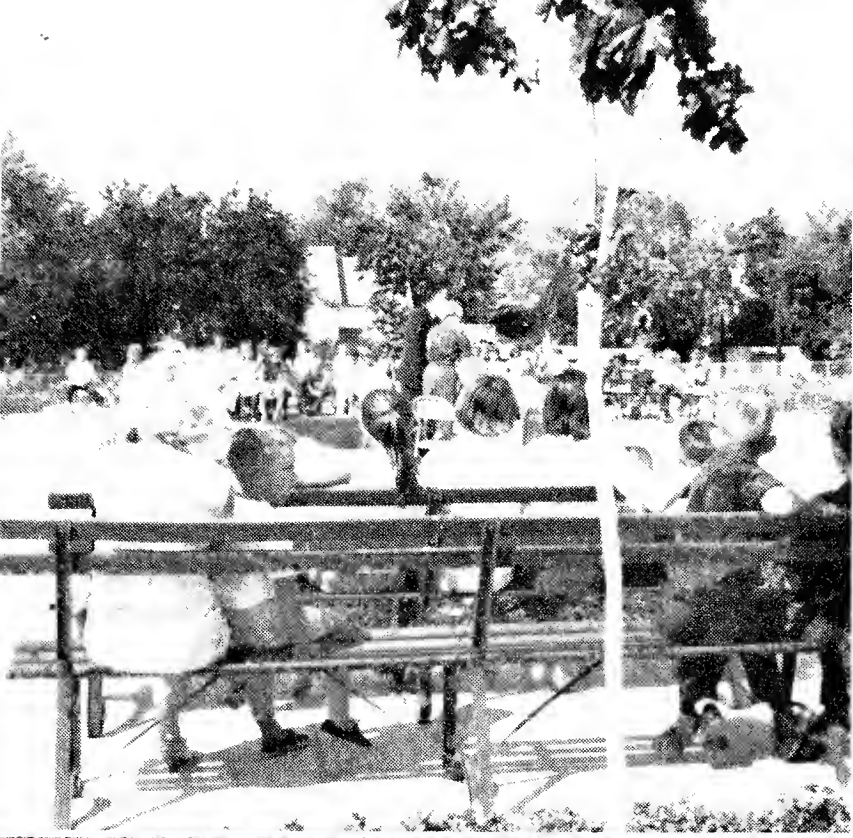
CREATIVE EXHIBIT

(1) Joan Kenney, (2) Ann Pugh, (3) Debbie Thompson.

This year 103 children completed the Children's Garden Program. Of these, 58 were beginners and 45 were advanced gardeners who had participated previously in at least one year's program. Eight of the beginners were brothers or sisters of children who had participated in last year's program. The



Tim Patrick and Tia Kawakami display some of their prize-winning flowers and vegetables.





advanced gardeners had somewhat larger plots and also received special instructions in starting plants indoors for later transplanting to the garden.

As usual the children prepared their own soil, planted, weeded, irrigated and cultivated their plots and harvested their products, under the supervision of the Botanic Gardens technical staff.

Like many other projects of the Denver Botanic Gardens, the Children's Garden Program would not be possible without the volunteer services of many devoted people. This year we were fortunate in again having Mrs.

.....
A Denver Botanic Gardens membership
makes the ideal Christmas gift.
.....

James C. Layden serve as Chairman of the Committee of Supervisors. Most of the success of this year's program is due to her capable leadership and tireless effort.

This year her supporting cast of supervisors was made up of parents of the children enrolled in the program. These included: Mrs. James Kenney, Mrs. C. A. Einarsen, Mrs. Edward Lupberger, Mrs. Henry Morgan, Mrs. Martin Jepkes, Mrs. John Vessa, Mrs. T. D. Thompson, Mrs. Bernard Lips, Mrs. Tony Joy, Mrs. Donald Turner, Mrs. Wm. Argall, Mrs. John Coyte, Mrs. R. V. Hirst, Mrs. Lawrence Danahay, Mrs. J. W. Craighead, Mrs. Bert Kauffman, Mrs. A. P. Marranzino, Mrs. Thomas Cooper, Mrs. Lowell Williams, Mrs. T. Schaetzel, Mrs. M. P. Fleming, Mr. and Mrs. James Habas, Mr. and Mrs. John Falkenberg, Mr. and Mrs. Philip McDonald, Mr. and Mrs. Ed Kawakami, Mr. and Mrs. Robert Ebert, Mr. Bernard Schorr, Mr. Howard Martin, Mr. Ray Price, Mr. James Melroy, Mr. Carl Olson,

Mr. John Wassberg and Mr. William Halls.

The supervisors were capably assisted in their work by members of the Junior Red Cross, under the general supervision of Mrs. Leonard Sahlen, a member of the Red Cross Committee for Junior Volunteer Programs.

Girls participating were: Kathleen Brandel, Cynthia Bryant, Janice Chaney, Esther Chiowith, Patricia Chism, Marianne Elmore, Sharon Inoustrn, Barbara Rudd and Sharon Tuyishima.

This was the first year that the children's gardens were rated by experienced judges. Mrs. Alonzo Lilly, Mrs. C. C. Buckbee and Mrs. Russell Qualls served faithfully in this capacity. These ladies are National Council Accredited Amateur Judges of the Colorado Federation of Garden Clubs, Inc. The gardens were judged at three different times—in June, July and August. Winners for the season were selected by considering the ratings of the three different judgments.

The exhibits at the Garden Fair also were rated by a panel of accredited judges consisting of Mrs. Alonzo Lilly, Mrs. C. C. Buckbee and Mrs. Claude Burt.

A much appreciated sequel to the 1963 Children's Garden Program was the recognition of the winning gardeners by the Denver Kiwanis Club. Tia Kawakami, first year gardener and Tim Patrick, advanced gardener were honored guests at the regular meeting and luncheon of the Club on September 18, at the Albany Hotel. Each received a check for \$5.00 from the Agricultural Committee of the Club. This is the third year that the Kiwanians have so honored our prize-winning gardeners.

Individuals and commercial firms made notable contributions to the Children's Garden Program this year.

Mr. James Kindblade gave us a stone laundry tub from which a very satisfactory vegetable washer was made by the Bell Plumbing Company, through the kindness of their Vice-President Mr. Norman Patrick.

Mr. Howard Martin, whose son was one of the young gardeners this year, planted and tended an exhibition garden in which some vegetables unusual in this area were grown, including broccoli and okra.

Mr. E. E. Eiche, local representative of the Ra-Pid-Gro Corporation donated fertilizer for the gardens and presented a good supply to each of the prize winning gardeners. He also gave a package of fertilizer to each gar-

dener who participated in the Clean-up Day activities.

Hannigan Floral Company donated plants for the children's plantings. Both Barteldes Seed Company and Rocky Mountain Seed Company generously gave seeds for the garden.

Mr. Bill Howell of the 7-Up Bottling Company again sponsored a 7-Up Club for enrollees of the Children's Garden. Each gardener was required to pull up seven weeds in the garden or surrounding area every day he came to work on his plot. A 7-Up party was held each month for children in good standing. This company also provided, gratis, the 7-Up served on graduation day.



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(Continued from page 281)

heath—*Erica*
heather—*Calluna*
hemlock—*Tsuga*
hickory—*Carya*
holly—*Ilex*
honey locust—*Gleditsia*
honeysuckle—*Lonicera*
hop hornbeam—*Ostrya*
hop tree—*Ptelea*
hornbeam—*Carpinus*
horse chestnut—*Aesculus*
hydrangea—*Hydrangea*

I

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J

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jasmine—*Jasminum*
jet bead—*Rhodotypos*
juniper—*Juniperus*

K

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katsura tree—*Cercidiphyllum*
kerria—*Kerria*
kinnikinnick—*Arctostaphylos*

L

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larch—*Larix*
lespedeza—*Lespedeza*
lilac—*Syringa*
linden—*Tilia*
locust—*Robinia*

M

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mahonia—*Mahonia*
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matrimony vine—*Lycium*
mimosa—*Albizzia*
mock orange—*Philadelphus*

mountain ash—*Sorbus*
mountain laurel—*Kalmia*
mountain mahogany—*Cercocarpus*
mountain privet—*Forestiera*
mulberry—*Morus*
myrtle—*Vinca*

N

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ninebark—*Physocarpus*

O

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Osage orange—*Maclura*

P

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pear—*Malus*
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pea shrub—*Caragana*
pepper bush—*Clethra*
periwinkle—*Vinca*
persimmon—*Diospyros*
pieris—*Pieris*
pine—*Pinus*
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plum—*Prunus*
poplar—*Populus*
prinsepia—*Prinsepia*
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R

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redbud—*Cercis*
redwood—*Sequoia*
rhododendron—*Rhododendron*
rock spirea—*Holodiscus*
rose—*Rosa*
rose acacia—*Robinia*
Russian olive—*Elaeagnus*

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S

sassafras—*Sassafras*
 sea buckthorn—*Hippophae*
 sequoia—*Sequoia*
 serviceberry—*Amelanchier*
 shrub althea—*Hibiscus*
 silver bell—*Halesia*
 silver vine fleece flower—*Polygonum*
 smoke tree—*Cotinus*
 snowberry—*Symphoricarpos*
 soapberry—*Sapindus*
 sophora—*Sophora*
 spirea—*Spiraea*
 spruce—*Picea*
 squaw apple—*Peraphyllum*
 St. Johnswort—*Hypericum*
 sumac—*Rhus*
 sweet gum—*Liquidambar*
 sweet shrub—*Calycanthus*
 sycamore—*Platanus*

T

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 tansy bush—*Chamaebatiaria*
 thimbleberry—*Rubus*
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 trumpet creeper—*Campsis*

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 tupelo—*Nyssa*

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 woadwaxen—*Genista*

Y

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 yellow root—*Xanthorrhiza*
 yellowwood—*Cladrastis*
 yew—*Taxus*
 yucca—*Yucca*

Z

zelkova—*Zelkova*



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A

- Abelia*, abelia Z
Abies, fir
 balsamea, balsam f F
 concolor, white f *B, a, m
 lasiocarpa, alpine f. Data on use at low altitudes very meager; good in cool, moist mountain locations..... *Z, b, m
 lasiocarpa arizonica, cork bark f. Data scarce; very promising..... *F, b, m
Acanthopanax, acanthopanax (aralia)
 sieboldianus, five-leaf a. Normally has some winter-kill. Good for shade.. B, a
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 pavia, red b..... F
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 julibrissin, silk tree a. (mimosa)..... Z
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 prunifolia (utahensis), Utah s..... *A, b
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 fontinalis, water b..... A, a, m, p

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Calluna, heather
vulgaris, Scotch h.....Z
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radicans, common t. c. Winter-kills back at firstB, a
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frutex, Russian p. s. A globe form selectionA, a, m, p
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microphylla, little-leaf p. s.....A, a, m, p
microphylla 'Tidy', 'Tidy' little-leaf p. s. A fern-leafed selectionA, a, m, p
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betulus, European h.....F
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'Blue Mist' b.....A, a
clandonensis 'Heavenly Blue',
'Heavenly Blue' b.....A, a
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danger greatZ
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americanus, Jersey tea (red-root).
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fendleri, Fendler c. This and the next are difficult to collect and are not available commercially*B, b
velutinus, snow brush c. Evergreen...*F, b
Cedrus, cedar. All true cedars are tender..Z
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scandens, American b. New varieties are self-pollinatedA, b
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transplantF, a
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Cephalanthus, buttonbush
occidentalis, common b.....F
Cercidiphyllum, katsura tree
japonicum, katsura tree.....Z
Cercis, redbud
canadensis, eastern r. Beautiful enough to justify a trial. Many
winter-killB, a
Cercocarpus, mountain mahogany
intricatus, little-leaf m. m.
Dry slopes*A, a
ledifolius, curl-leaf m. m.
EvergreenA, a

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- montanus*, true m. m.*A, b, m
- Chaenomeles*, flowering quince. Subject to chlorosis.
- japonica* 'Pygmaea', 'Pygmaea'
- Japanese f. q.A, b
- speciosa* 'Appleblossom',
- 'Appleblossom' common f. q.A, b
- superba* 'Indian Chief',
- 'Indian Chief' f. q.A, b
- 'Texas', 'Texas' f. q.A, b
- Chamaebatiaria*, tansy bush.
- millefolium*, tansy bush. Subject to red spiderB, a
- Chamaecyparis*, false cypress
- nootkatensis*, Nootka f. c. Virtually untried but seems to have promise for shadeF
- Chionanthus*, fringe tree
- virginicus*, white f. t.B, a
- Chrysothamnus*, rabbit brush (various species). For dry prairies*A, b, m, p
- Cladrastis*, yellowwood
- lutea*, American y.B, a
- Clematis*, clematis and virgin's-bower
- crispa*, curly c.A, a
- jackmani* 'Mme. Andre', 'Mme. Andre'
- Jackman c. Red.B, a
- lawsoniana henryi*, Henry c. White...B, a
- ligusticifolia*, western v.*A, b
- montana*, anemone c.F
- orientalis*, Oriental c.A, a, m
- paniculata*, sweet autumn c.A, a
- pseudoalpina*, Rocky Mountain c.
- Has been tried but little in
- Denver*B, b, m
- 'Ramona', 'Ramona' c. Blue.B, a
- tangutica*, golden c.A, a
- texensis*, scarlet c. Treat as a perennialA, a
- Clethra*, clethra (pepper bush)
- alnifolia*, summer sweet c.Z
- Colutea*, bladder senna
- arborescens*, common b. s.B, b
- istria*, bladder senna.A, a
- media*, hybrid b. s.B, b
- Cornus*, dogwood
- alba argenteo-marginata*,
- cream edge Tatarian d.B, a
- alba sibirica*, Siberian d. Subject to blight.B, a
- alternifolia*, pagoda d.B, a
- baileyi*, Bailey d.*A, b, m
- florida*, flowering d.Z
- mas*, corneliancherry d. Blooms infrequently but does not fruit.B, b
- racemosa*, gray d.A, a
- sanguinea*, blood twig d.A, b
- stolonifera coloradensis*, Colorado red osier d.*A, a, m
- stolonifera flaviramea*, yellow twig red osier d. Subject to black blight...F, b
- stolonifera* 'Kelsey Dwarf', 'Kelsey Dwarf' red osier d.B, a
- Corylus*, filbert (hazelnut)
- americana*, American f.F, b
- cornuta*, beaked f.*A, b, m
- Cotinus*, smoke tree
- americanus*, American s. t.B, a
- coggygia*, common s. t.B, a
- coggygia purpureus*, purple common s. t.A, a
- Cotoneaster*, cotoneaster
- acutifolia*, Peking c.A, a, m, p
- adpressa*, creeping c.B, a
- apiculata*, cranberry c.B, a
- dielsiana*, Diel's c.F
- divaricata*, spreading c.B, a
- glaucophylla*, bright bead c.B, a
- horizontalis*, rock c. Has been tried but littleB, a
- integerrima*, European c.A, a
- melanocarpa*, cotoneasterA, a
- microphylla*, rock spray c.B, a
- multiflora*, cotoneasterA, a
- racemiflora*, red bead c.B, a
- Cowania*, cliff rose
- stansburiana*, Stansbury c. r. Native, should be used more for dry locationsA, a
- Crataegus*, hawthorn
- ambigua*, Russian h.A, a, m, p
- arnoldiana*, Arnold h.A, a
- chrysocarpa* (*doddsii*),
- fireberry h.*A, a, m, p
- coccinioides*, Kansas h.B, a
- coloradensis*, Colorado h.*A, a
- crus-galli*, cockspur h.A, a
- intricata*, thicket h.A, a
- mollis*, downy h.A, a
- oxyacantha*, English h. Subject to fire-blightB, a
- oxyacantha pauli*, Paul's scarlet English h. Subject to fire-blight...B, a
- phaenopyrum*, Washington h.B, a
- punctata*, dotted h.B, a
- rivularis*, river h.B, b
- saligna*, willow h.*B, b
- succulenta*, fleshy h. Should be grown more*A, a
- Cytisus*, broom
- hirsutus*, broomF
- D**
- Daphne*, daphne
- cneorum*, rose d.F
- Deutzia*, deutzia
- gracilis*, slender d.F

Diospyros, persimmon
virginiana, common p.....Z

E

Elaeagnus, elaeagnus and Russian olive
angustifolia, Russian olive.....A, a, m, p
commutata, silverberry e. Suckers
freely*A, b, m
umbellata, autumn e.....A, b
Enkianthus, enkianthus
campanulatus, red vein e.....Z
Ephedra, ephedra
viridis, green e. Desert plant;
difficult to collect.....*B, b
Erica, heath.Z
Euonymus, euonymus. Best on the north
or east side of the house.

alata, winged e.....A, a
alata compacta, dwarf winged e.....A, a
americana, brook e.....B, a
atropurpurea, eastern wahoo.....A, a
'Burton's', 'Burton's' e.....A, a
europaea, European e.....A, b
europaea aldenhamensis,
Aldenhamensis European e.A, a
fortunei, winter creeper e.....A, a
fortunei gracilis (argenteo-marginata),
silver edged winter creeper e.B, b
fortunei minima, baby winter
creeper e.A, a
fortunei radicans, common winter
creeper e.A, a
fortunei 'Sarcoxie', 'Sarcoxie'
winter creeper e.....B, a
fortunei vegeta, big-leaf winter
creeper e.A, a
kiautschovica (patens), spreading e...B, a

Exochorda, pearl bush
racemosa, common p. b.....B, b

Fagus, beech **F**

sylvatica atropunicea, purple (cooper)
European b. Several have survived
in DenverB, a
Fallugia, Apache plume
paradoxa, Apache plume. Should be
used more; gets messy
with age*A, a, p
Fendlera, Fendler bush
rupicola, cliff F. b. Native, similar
to mock orange.....*A, a, m
Fontanesia, fontanesia
fortunei, Fortune f. Looks like a
tall honeysuckleA, a
Forestiera, forestiera (mountain privet)
neo-mexicana New
Mexican f.*A, a, m, p
Forsythia, forsythia. Spring frosts
often kill flowers.
intermedia, border f.....A, b

intermedia 'Beatrix Farrand', 'Beatrix
Farrand' border f.....A, a
intermedia 'Compacta Nana',
'Compacta Nana' border f.....A, a
intermedia 'Lynwood Gold',
'Lynwood Gold' border f.....A, a
intermedia spectabilis, showy
border f.A, a
intermedia 'Spring Glory',
'Spring Glory' border f.A, a
ovata, early f.....A, f
suspensa, weeping f.....A, b
suspensa fortunei, Fortune
weeping f.A, a

Franklinia (Gordonia), franklinia
alatomahia, frankliniaZ

Fraxinus, ash
americana, white a.....B, a
anomala, single-leaf a.....A, a
nigra, black a.....B, b
ornus, flowering a.....B, a
pennsylvanica lanceolata, green a...A, a, p
pennsylvanica lanceolata 'Marshall's
Seedless', 'Marshall's Seedless'
green a.A, a
quadrangulata, blue a.....F
Fuchsia, fuchsia
magellanica, Magellan f.....Z

G

Genista, woadwaxen
tinctoria, common w.....B, b
Ginkgo, ginkgo
biloba, ginkgoF, a
Gleditsia, honey locust
triacanthos, common h. l.....A, a, p
triacanthos inermis, thornless
common h. l.....A, a, p
triacanthos inermis 'Imperial', 'Imperial'
thornless common h. l.....A, a
triacanthos inermis 'Majestic',
'Majestic' thornless common h. l...A, a
triacanthos inermis 'Moraine',
'Moraine' thornless common h. l...A, a
triacanthos inermis 'Shademaster',
'Shademaster' thornless
common h. l.....A, a
triacanthos inermis 'Skyline',
'Skyline' thornless common h. l...A, a
triacanthos inermis 'Sunburst',
'Sunburst' thornless common h. l...B, a
Gymnocladus, coffee tree
dioicus, Kentucky c. t. Deep rooted..A, a

H

Halesia, silver bell.....Z
Hamamelis, witch hazel
virginiana, common w. h.....F
Hedera, ivy. Grows only in shade.
helix, English i.....B, a

helix baltica, Baltic English i. A, a
Hibiscus, shrub althea
syriacus, shrub althea B, a
syriacus 'Bluebird', 'Bluebird' s. a. B, a
syriacus 'Coelestis', 'Coelestis' s. a. B, a
syriacus 'Hamabo', 'Hamabo' s. a. B, a
Hippophae, sea buckthorn
rhamnoides, common s. b. Suckers
 freely A, b
Holodiscus, rock spirea
discolor, cream bush r. s. Has been
 tried but little F
dumosus, bush r. s. *A, b, m
Hydrangea, hydrangea. Prefers shade.
arborescens grandiflora, snow hill h.
 (A. G.) B, a
macrophylla 'Nikko Blue', 'Nikko Blue'
 big-leaf h. F, a
paniculata grandiflora, peegee panicle h.
 (P. G.) B, a
petiolaris, climbing h. F
quercifolia, oak-leaf h. F
serrata acuminata, hydrangea B
Hypericum, St. Johnswort
kalmianum, Kalm S. J. A, b
 'Hidcote', 'Hidcote' S. J. B, a

I

Ilex, holly Z

J

Jamesia, jamesia
americana, cliff j. *B, a
Jasminum, jasmine
nudiflorum, winter j. B, b
Juglans, walnut and butternut
cinerea, butternut F, b
nigra, eastern black w. B, a
regia, Persian w. F, a
rupestris, Texas black w.
 Fast growing F, b
Juniperus, juniper
chinensis, pyramid Chinese j.
 Holds dead needles B, b
chinensis, 'Armstrong', 'Armstrong'
 Chinese j. A, a
chinensis 'Hetz', 'Hetz' Chinese j. A, a
chinensis japonica, Japanese j.
 Often listed as *J. procumbens* A, a
chinensis 'J. C. Weaver', 'J. C. Weaver'
 Chinese j. For shade A, a
chinensis 'Maney', 'Maney' Chinese j. A, a
chinensis pfitzeriana, Pfitzer Chinese j.
 One of the finest evergreens. A, a, m, p
chinensis pfitzeriana 'Aurea', 'Golden'
 Pfitzer Chinese j. B, a
chinensis pfitzeriana 'Compacta',
 'Compact' Pfitzer Chinese j. A, a
chinensis sargentii, Sargent Chinese j. A, a
communis saxatilis, mountain common j.
 Browns in full sun *A, b, m

excelsa, Greek j. F, b
horizontalis, creeping j. *B, a
horizontalis 'Admirabilis', 'Admirabilis'
 creeping j. A, a
horizontalis 'Bar Harbor', 'Bar Harbor'
 creeping j. B, a
horizontalis 'Black Hills', 'Black Hills'
 creeping j. B, a
horizontalis 'Lividus', 'Lividus'
 creeping j. A, a
horizontalis 'Petraeus', 'Petraeus'
 creeping j. A, a
horizontalis 'Planifolius', 'Planifolius'
 creeping j. A, a
horizontalis plumosa, Andorra
 creeping j. B, a
horizontalis 'Wilton', 'Wilton'
 creeping j. A, a
horizontalis 'Wyoming', 'Wyoming'
 creeping j. B, a
monosperma, one seed j. Tolerates alkaline
 soils; prune severely to prevent snow
 damage *B, b, m, p
pachyphloea, alligator j. B, a
procumbens, Jap garden j. A, a
sabina, Savin j. A, b
sabina 'Russian #3', 'Russian #3'
 Savin j. A, a, m
sabina 'Russian #4', 'Russian #4'
 Savin j. A, a, m
sabina tamariscifolia, tamarix Savin j.
 Very fine A, a
sabina 'Von Ehron', 'Von Ehron'
 Savin j. A, b
scopulorum, Rocky Mountain j. Subject to
 aphids and mites. *A, a, m, p
scopulorum 'Blue Haven', 'Blue Haven'
 Rocky Mountain j. A, a
scopulorum 'Cologreen', 'Cologreen'
 Rocky Mountain j. A, a
scopulorum 'Gray Gleam', 'Gray Gleam'
 Rocky Mountain j. A, a, m, p
scopulorum 'Hill's Silver', 'Hill's Silver'
 Rocky Mountain j. A, a
scopulorum 'Marshall', 'Marshall'
 Rocky Mountain j. A, a
scopulorum 'Moffett', 'Moffett'
 Rocky Mountain j. A, a
scopulorum 'Pathfinder', 'Pathfinder'
 Rocky Mountain j. A, a, m, p
scopulorum 'Sutherland', 'Sutherland'
 Rocky Mountain j. A, a, m, p
scopulorum 'White's Silver King', 'White's
 Silver King' Rocky Mountain j. A, a
squamata meyeri, Meyer single
 seed j. B, b
utahensis, Utah j. *A, b, m, p
virginiana, eastern red cedar. Subject
 to aphids and mites. A, a

virginiana burkii, Burk eastern
 red cedar A, a
virginiana canaertii, Canaert eastern
 red cedar A, a
virginiana 'Dundee', 'Dundee' eastern
 red cedar A, a
virginiana 'Erecta Glauca', 'Erecta Glauca'
 eastern red cedar A a,
virginiana 'Hillbush', 'Hillbush' eastern
 red cedar B, a
virginiana 'Hillspire', 'Hillspire' eastern
 red cedar A, a
virginiana keteleeri, Keteleer eastern
 red cedar A, a
virginiana venusta, green pyramid
 eastern red cedar B, b

K

Kalmia, kalmia (mountain laurel)
latifolia, mountain laurel k..... Z
Kerria, kerria
japonica, Japanese k..... F
Koelreuteria, golden rain tree
paniculata, paniced g. r. t. Sometimes
 winter-kills back B, a
Kolkwitzia, beauty bush
amabilis, beauty bush A, b

L

Laburnum, laburnum (golden chain)
anagyroides, golden chain l..... B, a
watereri (vossii), Waterer l..... B, a
Lagerstroemia, crape myrtle
indica, common c. m..... Z
Larix, larch
decidua, European l..... B, a
laricina, eastern l..... B, a
sibirica, Siberian l. Shows promise... B, a
Lespedeza (Desmodium), lespedeza
bicolor, shrub l. Dies back..... A, b
Ligustrum, privet
amurense 'North', 'North' Amur p... A, b
amurense 'South', 'South' Amur p..... Z
ibolium, ibolium p..... A, b

ibota, Ibota p..... A, b
ibota 'Vicari', 'Vicari' Ibota p..... B, a
obtusifolium regelianum, Regel's
 border p. A, a
ovalifolium, California p..... F
vulgare, European p..... A, a
vulgare, 'Nanum', 'Lodense'
 European p. A, a
vulgare 'Polish', 'Polish'
 European p. A, a

Liquidambar, sweet gum
styraciflua, American s. g..... Z
Liriodendron, tulip tree
tulipifera, tulip tree. Beautiful;
 worth a try..... F, a

Lonicera, honeysuckle

bella, Belle h..... A, b
'Clavey's', 'Clavey's' h..... B, b
fragrantissima, winter h. B, b
heckrottii, everblooming h..... A, a
heckrottii 'Goldflame', 'Goldflame'
 everblooming h. A, a
involucrata, bearberry h. Subject to chlo-
 rosis. Needs deep, moist shade... *A, b
japonica halliana, Hall's Japanese h... A, a
korolkovii, blue-leaf h..... A, a
korolkovii zabelii, blue-leaf h..... A, a, p
maackii, Amur h..... A, b
maximowiczii sachalinensis,
 Sakhalin h. A, b
morrowii, Morrow h..... A, b
periclymenum, woodbine h..... A, b
sempervirens, trumpet h..... A, a
spinosa alberti, Albert thorn h.... B, b, p
syringantha, lilac h..... A, a
tatarica, Tatarian h..... A, b
tatarica 'Arnold's Red', 'Arnold's Red'
 Tatarian h. A, a

Lycium, matrimony vine
halimifolium, matrimony vine..... A, f

M

Maclura, Osage orange
pomifera, Osage orange..... F, b



SWINGLE TREE SURGEONS, INC.
 EXTENDS
 Holiday Greetings
 TO OUR MANY CUSTOMERS

Magnolia, magnolia. A few have survived in Denver.

acuminata, cucumber tree m.....F, a
grandiflora, southern m.....Z
soulangeana, saucer m.....F
stellata, star m.....F

Mahonia, mahonia and Oregon grape
aquifolium, Oregon grape. Best in a protected locationB, a
aquifolium 'Compacta', 'Compacta' Oregon grapeA, a
nervosa, Cascade's m.....B, a
repens, creeping m.....*A, a, m, p

Malus, crab apple and pear
'Almey', 'Almey' c.a.....A, a
arnoldiana, Arnold c.a.....A, a
baccata, Siberian c.a.....A, b
communis, common pear. Subject to fire-blightF
coronaria, wild sweet c.a.....B, a
'Dolgo', 'Dolgo' c.a.....A, a
'Dorothea', 'Dorothea' c.a.....B, a
'Flame', 'Flame' c.a.....B, a
floribunda, Japanese flowering c.a....B, a
halliana parkmanii, Parkman c.a....F, a
'Hillborn', 'Hillborn' c.a.....B, a
'Hopa', 'Hopa' c.a.....A, a
ioensis, Iowa c.a.....A, b
ioensis 'Plena', 'Bechtel' c.a. Affected by fire-blight and sun-scalding.....A, a
'Jay Darling', 'Jay Darling' c.a.....A, a
'Katherine', 'Katherine' c.a.....B, a
'Klehm', 'Klehm' c.a.....A, a
pumila niedzwetzkyana, redvein c.a...A, b
purpurea 'Eleyi', 'Eleyi' c.a.....A, a
'Radiant', 'Radiant' c.a.....A, a
'Red Jade', 'Red Jade' c.a.....B, a
'Red Silver', 'Red Silver' c.a.....A, a
'Red Splendor', 'Red Splendor' c.a....A, a
sargentii, Sargent c.a.....B, a
scheideckeri, Scheidecker c.a.....B, a
'Strathmore', 'Strathmore' c.a.

Subject to fire-blight.....A, b

theifera, tea c.a.....B, a
'Van Eseltine', 'Van Eseltine' c.a....A, a
'Wabiskaw', 'Wabiskaw' c.a.....A, a

Metasequoia, dawn redwood
glyptostroboides, dawn redwood.....F

Morus, mulberry
alba, white m. Winter-kills.....B, b
alba pendula, weeping white m.....B, b
alba tatarica, Russian m. Recommended for shelter belts in dry land areas..B, b

N

Nandina, nandina
domestica, nandinaF, a
Nyssa, tupelo (gum)
sylvatica, black t.....Z

O

Ostrya, hop hornbeam
virginiana, American h.h.....F

P

Pachistima, pachistima
myrsinites, myrtle p. Very difficult to transplant*B, a, m
Parthenocissus, creeper
quinquefolia, Virginia c.....A, b
quinquefolia engelmannii, Engelmann Virginia c.....A, a
quinquefolia saint-paulii, St. Paul Virginia c.A, a
tricuspidata, Japanese c. (Boston ivy)A, a

Peraphyllum, squaw apple
ramosissimum, squaw apple. Should be tried more often.....*B, b

Phellodendron, cork tree
amurense, Amur c.t.....Z

Philadelphus, mock orange
coronarius, sweet m.o.....A, a
cymosus 'Atlas', 'Atlas' cymosus m.o..B, a
grandiflorus, big scentless m.o.....A, a
lemoinei, Lemoine m.o.....A, a
lemoinei 'Belle Etoile', 'Belle Etoile' Lemoine m.o.B, a
lemoinei 'Enchantment', 'Enchantment' Lemoine m.o.B, a
lemoinei 'Innocence', 'Innocence' Lemoine m.o.B, a
lemoinei 'Sylviane', 'Sylviane' Lemoine m.o.B, a
lemoinei, Lemoine m.o. All other hybridsB, a
lewisii, Lewis m.o.....A, b
microphyllus, little-leaf m.o.....B, b
'Minnesota Snowflake', 'Minnesota Snowflake' m.o.A, a
virginalis, *virginalis* m.o.....B, a
virginalis 'Bouquet Blanc', 'Bouquet Blanc' *virginalis* m.o.....B, a

Physocarpus, ninebark
bracteatus (ramaleyi), twin pod (Ramaley) n.*A, b, m
monogynus, mountain n.....*A, b
opulifolius, common n.....A, b
opulifolius nanus, dwarf common n...A, a

Picea, spruce
abies, Norway s.....B
abies maxwelli, Maxwell Norway s...A, a
abies nidiformis, nest Norway s.....B, a
abies remontii, Remont Norway s....A, a
engelmanni, Engelmann s.....*B, b, m
glauca, white s.....F, a
glauca conica, dwarf white s. Use in protected locations.....B, a
glauca densata, Black Hill's white s...A, a

'Multnomah', 'Multnomah' s.....B, a
pungens, Colorado s.....*A, a, m, p
Pieris, pieris.....Z
Pinus, pine
 aristata, bristle cone p.....*A, a, m
 cembra, Swiss stone p.....A, a
 cembroides edulis, Colorado pinyon p.
 Should not be
 over watered*A, a, m, p
 contorta, shore p.....F, a
 contorta latifolia, lodge pole p.
 Subject to chlorosis.....*A, b, m
 densiflora umbraculifera, umbrella
 Japanese red p.....A, a
 flexilis, limber p.....*A, a, m
 mugo mughus, mugho Swiss
 mountain p.A, a
 nigra, Austrian p.....A, a, p
 ponderosa, ponderosa p.....*A, a, m, p
 strobus, eastern white p.
 Often sun-scalds.B, a
 sylvestris, Scotch p.....A, b
Platanus, plane tree (sycamore)
 acerifolia, London, p.t.....B, a
 occidentalis, American p.t.
 Subject to anthracnose.....B, a
 orientalis, Oriental p.t.....B, a
Polygonum, silver vine fleece flower
 auberti, silver vine fleece flower.....A, a
Populus, poplar and aspen. All short lived
 and soon ruined by insects and diseases.
 acuminata, lance-leaf p.....*A, a, m
 alba, white p. Suckers freely.....A, b
 alba pyramidalis, Bolleana white p.....F
 angustifolia, narrow-leaf p.....*A, b, m
 canadensis erecta, pyamidal
 Carolina p.....F
 canescens, gray p.....A, b
 nigra, black p.....B, b
 nigra italica, Lombardy p.....F
 sargentii, plains p. (cottonless male trees).
 Longer lived than others.....*A, a, m
 simonii, Simon p.....B, b
 suaveolens, Mongolian p.....A, b
 tremuloides, quaking a.
 Difficult in Denver.....*A, a, m, p
 tristis, brown twig p.....A, a
Potentilla, cinquefoil
 fruticosa, bush c.....*A, b, m
 fruticosa dahurica, Dahurian
 bush c.....A, b
 fruticosa farreri, Farrer bush c.....A, a
 fruticosa friedrichsenii, Friedrichsen
 bush c.A, a
 fruticosa 'Gold Drop', 'Gold Drop'
 bush c.A, a
 fruticosa 'Kay Dykes', 'Kay Dykes'
 bush c.A, a

fruticosa 'Klondyke', 'Klondyke'
 bush c.A, a
 fruticosa 'Lemon Drop', 'Lemon Drop'
 bush c.A, a
 fruticosa 'Mt. Everest', 'Mt. Everest'
 bush c.A, a
 fruticosa 'Primrose Beauty', 'Primrose'
 Beauty' bush c.....A, a
 fruticosa veitchii, Veitch bush c.....A, a
Prinsepia, prinsepia
 sinensis, cherry p.....A, b
 uniflora, hedge p.....A, b
Prunus, plum, cherry, apricot, birdcherry,
 chokecherry and peach.
 americana, American plum.....*A, b, m
 americana 'Newport', 'Newport'
 American plumA, a
 americana 'Thundercloud', 'Thundercloud'
 American plumB, a
 cistena, plum.....A, a
 dauidiana, David peach.....A, b
 glandulosa, almond cherry.....B, a
 'Hansen', 'Hansen' plum.....A, b
 mandshurica, Manchurian apricot....A, a
 padus, European b.....A, a
 pedunculataA, b, m, p
 pensylvanica, pin cherry.
 Suckers freely*A, b, m
 persica, peach. Undependable fruiting
 in DenverB, a
 persica atropurpurea, purple peach...A, a
 pumila, sand cherry.....*A, b, m
 salicina, Japanese plum.....F, a
 serotina, black cherry. Sun-scalds...B, a
 tenella, Russian almond.....B, b
 tomentosa, Manchu cherry.
 Good fruitA, b
 triloba, flowering plum.....A, a
 virginiana demissa, western
 chokecherry*A, b
Pseudotsuga, Douglas fir
 taxifolia, common D. f. Alternate host of
 spruce gall aphids. Good for altitudes
 over 6,000 feet.....*A, b, m
Ptelea, hop tree
 trifoliata, common h.t.....*A, b
Purshia, bitter brush
 tridentata, antelope b.b.....*B, b, m
Pyracantha, firethorn. Dependable in the
 southern part of Colorado.
 coccinea lalandii, Laland f.t.....B, a
 coccinea 'Wyatti', 'Wyatti' f.t......B, a
Pyrus, see *Malus communis*

Quercus, oak Q
 alba, white o.....A, b
 borealis, northern red o. Somewhat
 subject to chlorosis.....B, a
 coccinea, scarlet o.....B, b

falcata, southern red o. B, a
gambeli, Gambel (scrub) o. Almost
impossible to transplant. . . . *A, a, m, p
macrocarpa, bur o. A, a
palustris, pin o. Very subject to
chlorosis B, a
robur, English o. A, a

R

Rhamnus, buckthorn
cathartica, common b. A, b
frangula, glossy b. B, b
frangula 'Tall Hedge', 'Tall Hedge'
glossy b. A, a
Rhododendron, rhododendron and azalea. . Z
Rhodotypos, jet bead
scandens, black j. b. B, a
Rhus, sumac
aromatica, fragrant s. A, b
glabra, smooth s. A, a
glabra cismontana, Rocky
Mountain smooth s. *A, a, m, p
glabra laciniata, cut-leaf
smooth s. A, a, p
trilobata, skunk bush s. *A, b, m, p
typhina, stag horn s. A, a, p
Ribes, currant and gooseberry
alpinum, alpine c. A, a, m
americanum, American black c. . . . *A, b
aureum, golden c. *A, b, m
cereum, wax c. *B, b, m
coloradense, Colorado c. *A, b
diacanthum, Siberian c. A, b
inermis, white stem g. *A, b
Robinia, locust and rose acacia
hispidia, rose acacia. Suckers. A, b
neo-mexicana, New Mexico l.
Suckers *A, b, m, p
pseudoacacia, black l. Subject to
borers F
Rosa, rose
blanda, Meadow r. A, b
Climber roses A, a
Floribunda roses A, a
foetida bicolor, Austrian copper r. . . A, a
harisonii, Harison yellow r. A, b
hugonis, Father Hugo r. Seldom
effective. Severe insect damage. . . B, a
Hybrid teas A, a

Miniature roses A, a
multiflora, Japanese r. B, b
rubrifolia, red-leaf r. A, b
rugosa, rugosa r. B, a
rugosa, 'Grootendorst', 'Grootendorst'
rugosa r. B, b
setigera, prairie r. A, a
Tree roses F

Rubus, raspberry and thimbleberry

deliciosus, boulder r. *A, a, m
parviflorus, western t. *A, b

S

Salix, willow. All willows are generally
damaged by canker.

alba, white w. A, b
amygdaloides, peach-leaf w. *A, f
babylonica, Babylon weeping w. . . . B, a
blanda, Wisconsin weeping w. B, a
discolor, pussy w. B, b
exigua, coyote w. *A, f, m
irrorata, blue stem w. *A, a, m, p
nigra, black w. B, b
pentandra, laurel w. B, a
purpurea gracilis, slender purple
osier w. A, a, m, p
purpurea nana, dwarf purple osier w. . B, a

Sambucus, elder

canadensis, American e. A, a
canadensis acutiloba, cut-leaf
American e. A, a
canadensis aurea, golden American e. . B, b
coerulea, blueberry e. A, a, m, p
coerulea neo-mexicana, New

Mexican blueberry e. A, a, m, p
microbotrys, bunchberry e. *A, b

Sapindus, soapberry

drummondii, western s. F

Sassafras, sassafras

albidum, common s. Z

Sciadopitys, umbrella pine

verticillata, umbrella pine. Z

Sequoia, sequoia and redwood

gigantea, giant s. Z

sempervirens, redwood Z

Shepherdia, buffaloberry

argentea, silver b. *A, b, m

canadensis, russet b. Needs shade

and acid soil. *B, a, m

**Sophora*, sophora (pagoda tree)

japonica, Japanese pagoda tree.

Hard starting B, a

Sorbaria, false spirea

aitchisonii, Kashmir f.s. A, a

arborea glabrata, smooth tree f.s. . . A, a

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sorbifolia, Ural f.s.....A, b
Sorbus, mountain ash. Often sun-scalds unless wrapped.
americana, American m.a.....B, a
aucuparia, European m.a.....B, a
decora, showy m.a.....B, a
scopulina, Green's m.a.....*B, a
 species. Various of the oak-leafed types.B, a
tianshanica, mountain ash.
 ShrubA, a, m, p
Spiraea, spirea
albiflora, Japanese white s.....B, b
arguta, garland s.....A, a
billiardii, Billiard s.....B, b
bumalda, Bumalda s.....B, b
bumalda 'Anthony Waterer', 'Anthony Waterer' Bumalda s.....B, b
bumalda froebeli, Froebel Bumalda s.
 Subject to chlorosis.....B, a
nipponica, Nippon s.....A, a
prunifolia plena, double bridal wreath s. Subject to chlorosis.....B, b
trichocarpa, Korean s.....A, a
trilobata, three lobe s.....A, a
vanhouttei, Vanhoutte s.....A, a, p
Staphylea, bladdernut
bumalda, Bumalda b.....B, a
Symphoricarpos, snowberry and coralberry
albus, common s.....A, a
chenaultii, Chenault c.....B, a
chenaultii 'Hancock', 'Hancock'
 Chenault c.B, a
mollis, spreading s.....A, b
occidentalis, western s.....*A, b
orbiculatus, Indian currant c.....A, b
oreophilus, mountain s.....*A, a, m
Syringa, lilac
amurensis japonica, Japanese tree l...A, a
chinensis, Chinese l.....A, a
josikaea, Hungarian l.....A, a
pekinensis, Pekin l.....A, a
persica, Persian l.....A, a
persica laciniata, cut-leaf Persian l...B, a
prestonae, Preston l.....A, a, m
villosa, late l.....A, a
vulgaris, common l.....A, a, m, p
vulgaris, common l. French hybridsA, a
Tamarix, tamarisk **T**
africana, African t.....F
hispida, Kashgar t. Subject to leaf-hopper damage.A, b
pentandra, five stamen t.....A, b
Taxodium, bald cypress
distichum, common b.c.....F
Taxus, yew
baccata, English y.....Z

chinensis, Chinese y.....Z
cuspidata nana, dwarf Japanese y.
 Keep in shade.....B, a
media 'Brown's', 'Brown's' Anglo-jap y. Semi-shade.....B, a
media 'Halloran', 'Halloran' Anglo-jap y. Semi-shade.....B, a
media hatfieldii, Hatfield Anglo-jap y. Semi-shade.....B, a
media hicksii, Hicks' Anglo-jap y. Semi-shade.B, a
Thuja, arborvitae
occidentalis, eastern a. In protected locations with semi-shade.....B, a
orientalis, Oriental a.....F
Tilia, linden (basswood)
americana, American l.....A, a
americana 'Redmond', 'Redmond' American l.A, a
cordata, little-leaf l. Very desirable..A, a
europaea, European l.....A, a
platyphyllos, big-leaf l.....B, a
Tsuga, hemlock.....Z

U
Ulmus, elm
americana, American e. Subject to scale, Dutch elm disease and phloem necrosisB, a
americana ascendens, upright American e.B, a
carpinifolia 'Christine Buisman', 'Christine Buisman' smooth-leaf e. Resistant to Dutch elm disease and phloem necrosisA, a
parvifolia, Chinese e.....Z
procera, English e.....A, a
pumila, Siberian e. Good for dry locations.....A, f, p
thomasii, rock e.....B, a

V
Vaccinium, blueberry.....Z
Viburnum, viburnum
acerifolium, maple-leaf v.....F
burkwoodii, Burkwood v.....B, a

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<i>carlesii</i> , Korean spice v.....B, a	lilac c.t. Kills back like <i>Buddleia davidi</i>
<i>cassinoides</i> , withe rod v.....F	but the roots are hardy.....B, a
<i>dentatum</i> , arrowwood v.....A, a	<i>negundo incisa</i> , cut-leaf c.t.....B, b
<i>dilatatum</i> , linden v.....F	<i>Vitis</i> , grape
<i>lantana</i> , wayfaring tree v.....A, a	'Beta', 'Beta' g.....A, a
<i>lentago</i> , nannyberry v.....A, a	'Concord', 'Concord' g.....B, a
<i>molle</i> , Kentucky v.....F	'Niagara', 'Niagara' g.....B, a
<i>opulus</i> , European cranberry bush v...A, a	
<i>opulus nanum</i> , dwarf European	W
cranberry bush v.....A, a	<i>Weigela</i> , weigela
<i>opulus roseum</i> , common snowball v...A, a	'Bristol Ruby', 'Bristol Ruby' w.....B, a
<i>pauciflorum</i> , mooseberry v. Good	'Vaniceki', 'Vaniceki' w.....B, a
for mountain sites.....*B, b, m	<i>Wisteria</i> , wistaria
<i>prunifolium</i> , black haw v.....B, a	<i>frutescens</i> , American w.....B, a
<i>rhytidophyllum</i> , leather-leaf v.....F	X
<i>tomentosum</i> , double file v.....F	<i>Xanthoceras</i> , yellow horn
<i>trilobum</i> , American cranberry	<i>sorbifolium</i> , shiny-leaf y.h.....A, b
bush v.....A, a	<i>Xanthorrhiza</i> , yellow root
<i>wrightii</i> , Wright v.....B, a	<i>simplicissima</i> , yellow root.....Z
<i>Vinca</i> , periwinkle (myrtle)	
<i>minor</i> , common p.	Y
(creeping myrtle)A, a	<i>Yucca</i> , yucca
<i>Vitex</i> , chaste tree	<i>glauca</i> , small soap weed y....*A, a, m, p
<i>agnus-castus latifolia</i> (<i>macrophylla</i>), hardy	Z
	<i>Zelkova</i> , zelkova
	<i>serrata</i> , Japanese z.....Z

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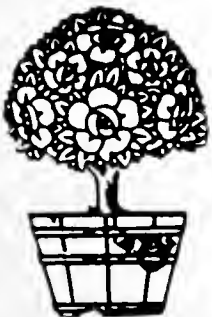
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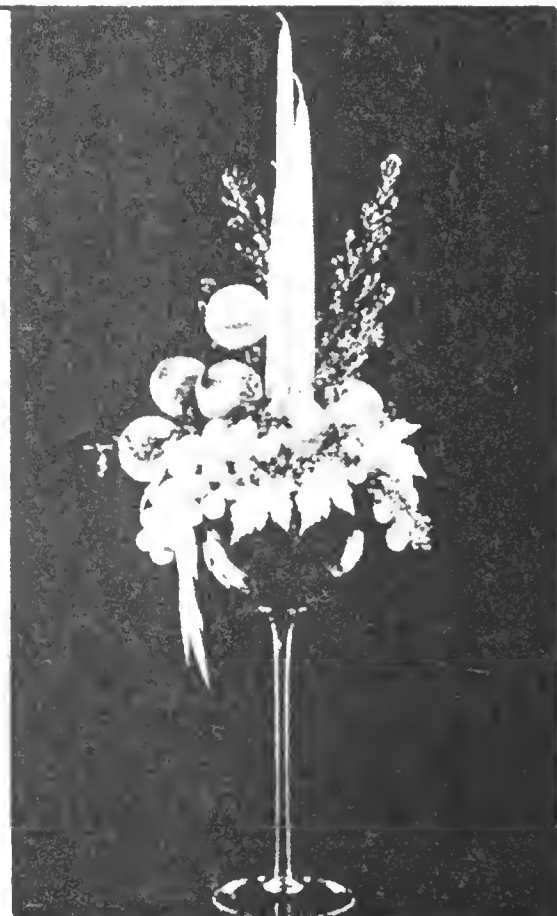
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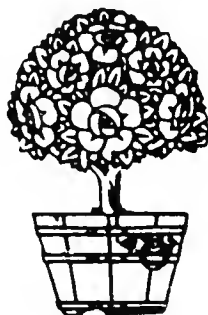
The Green Thumb

A Publication of Denver Botanic Gardens

JANUARY - FEBRUARY

1964





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JAN. - FEB.

Vol. 21

No. 1



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THE COVER

The fruit of the American plane tree or sycamore
(*Platanus occidentalis*) as seen in the winter. Pho-
tograph courtesy of Charles J. Ott.

JULIA ANDREWS

FRANCES NOVITT



THE GREEN THUMB Editorial Committee will miss the ability of Julia Andrews, who has recently married and left Denver to live in Sierra Leone, West Africa. She and her new husband, British-born Antony Jones, were married in Fort Collins, Julia's home town, on November 9. Their names are now Mr. and Mrs. Antony Andrews-Jones. Soon after the wedding they left Colorado to spend some time in England before arriving at their home in Freetown, Sierra Leone, in time for Christmas. They met while he was studying at the Colorado School of Mines, on leave from the Sierra Leone Government, where he has a permanent position as geo-chemist. They hope to make periodic visits to Colorado, the first to be in the early summer of 1965.

Julia, a graduate of the Department of Landscape Architecture at Iowa State University and a member of the

American Society of Landscape Architects, was associated for several years as a partner in the firm of Jane Silverstein Ries and Julia H. Andrews, in the practice of landscape architecture. She gave freely of her enthusiasm, time and energy to many projects of the Rocky Mountain Chapter of the American Society of Landscape Architects and to the Denver Botanic Gardens, especially the Editorial Committee of *The Green Thumb*.

We all miss her and our very best wishes go out to her and her husband as they start their new life. We hope to have the pleasure of seeing them when they visit here in 1965.

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New Library Hours

AND A NEW LIBRARIAN

HELEN M. VINCENT

"THE LIBRARY is the backbone of any institution, such as Denver Botanic Gardens, where research and education for public benefit are the prime functions." This statement, made by Dr. A. C. Hildreth, Director, applies especially to the Helen K. Fowler Library at Botanic Gardens House. We are proud of this library, for it is a mainstay to the members of the staff in giving bona fide information in answer to the many horticultural questions they must answer; it provides a wealth of material for the articles written on horticultural and botanical subjects; it offers a realm of knowledge to the gardener, the nurseryman, the arborist, the landscape designer (professional and amateur) and to anyone who is interested in nature's amazing cycle of plant life.

This library must be used and the books widely circulated in order to fulfill its purpose. We realize that the weekday hours it has been open in the past make it impossible for many people to use it who would like to do so. With the feeling, therefore, that we are responding to a necessity, it is our pleasure to announce new Saturday hours for library use: after January 1, 1964, it will be open from 10:00 a.m. until 3:00 p.m. Visitors will be welcomed and assisted by our new volunteer librarian, Miss Lucy M. Crissey, who comes to us from Columbia University Library School, well-qualified

to be of help to our members and friends. Access to the library will be from the front terrace of the Botanic Gardens House at 909 York Street. Members, as always, may check out books for a period of three weeks and everyone, whether a member or not, is invited to come in, read and browse in the hospitable atmosphere. A telephone has been installed so that information about our books may be obtained if a visit is impossible. The telephone numbers are 297-2428 and 297-2632.

This is our invitation to you — make use of this wonderful library. There is no charge for the service and there is a wealth of information available for the seeking on many subjects: trees, wild-flowers, perennials, annuals, shrubs, landscape architecture, house plants, flower arranging, bonsai, individual plants such as roses, orchids, African violets and others too numerous to mention. You must browse to learn. There is also a pamphlet file containing valuable papers on specific phases of botany and horticulture, and publications from other botanical gardens and arboretums are available for perusal in the library.

It is significant to state here that we would be unable to offer this new and extended service were it not for the devoted efforts of Mrs. Arthur Hellriegel, the generosity of Mrs. Alexander Barbour and the timely arrival of Miss Crissey. Mrs. Hellriegel, whom many

of you know, has for five years worked as a volunteer in the library, rearranging the books in order to incorporate many new acquisitions obtained through gifts and purchases. She has, at the same time, performed all of the other tasks of the trained librarian, without which service we would have been at a great loss. She is a graduate of the University of Denver School of Librarianship and worked for the Denver Public Library in various departments, including Science and Engineering for eight years. After spending four years in the Wichita City Library as a Librarian in the Reference and Government Documents Departments, she had a 15 year affiliation with Lowry Air Force Base as Base Librarian. The wealth of knowledge accumulated during these interesting years has been her gift to us — its value is inestimable. The Library Committee, carrying out a revamping program devised by the late Chairman, Mr. Fred Johnson, assisted Mrs. Hellriegel in updating the library and making it more functional.

We are fortunate, too, to have secured the volunteer assistance of Miss Crissey, whose background in the field of library work is very impressive. Miss Crissey received her A.B. degree from Mount Holyoke College and her B.S. degree from Columbia University's School of Library Service. For six years she was associated with the New

York Public Library as an assistant branch librarian and secretary of the Training Class. The next 33 years were spent as Assistant to the Dean of the School of Library Science, Columbia University. In this position she was responsible at different times for admission, student counseling and placement, plus secondary administrative duties at all times. Related activities in which Miss Crissey has participated include: member of the Council that published *Who's Who in Library Service*, 3rd edition, committee membership, chiefly in recruiting activities, in the American Library Association, The New York Library Club, The New York Library Association and The Association of American Library Schools. Miss Crissey also served two terms as Secretary of the New York Library Club.

Miss Crissey's fine background will, we are certain, add immeasurably to the usefulness of our library.

We sincerely hope that you who are reading this will be as pleased with the innovation as we are and that you will take advantage of it. We all know that there are going to be some cold, dreary, winter days ahead when the old green thumb will have to be pampered. Brighten those days and refresh your mind with a good book on a good subject — it will help to enrich your enjoyment of nature in the future.

MANY SPRUCE TREES are showing excessive needle cast.

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MEMBER



PLANNING A SPACE GARDEN OR A GARDEN SPACE? **Plant Perennials!**

BERNICE LUCAS PETERSEN



IN THIS AGE of satellites and space-ships the contemporary gardener might cultivate only sweet rockets, moonflowers, sunflowers and shooting stars. Whether your space garden encompasses two city lots or a small acreage, a well-planned perennial border orbiting on your garden axis is a must.

Assuming earth-bound gardeners will remain active for a few more enjoyable years, suggestions for planning a perennial border in your garden space are appropriate. "A few enjoyable years" is the phrase that cinches the planting of perennials. Some, such as peony, gas plant, lupine and Christmas rose are cherished for their endurance and resent being disturbed at all. Most perennials, however, should be divided every three years and aggressive varieties of chrysanthemums, hardy asters, day lilies and iris require even annual division.

When choosing plants for a given location, remember a sunny border requires a different series of plants than a shady one. Consider whether your background is a brick wall, sapling fence or the ideal dense planting of trees, shrubs or evergreens. Consider, too, the foreground. Is it a plush expanse of greensward or a bare driveway? Duration and intensity of sunlight have a definite bearing on plant suitability, amount of bloom and degree of color trueness.

After you have defined your perennial border in location and shape draw the border to scale on paper; two feet to the inch is satisfactory. In this planning stage most flower-happy individuals anticipate how many kinds of plants they can accommodate instead of how few. Restraint is the key. Big, bold masses of a few flowers add zest to any border. Unless the plant

spreads quickly avoid planting less than three of a kind, preferably five. Bulbs should be planted 12 to 25 of a variety in a colony. However, small gardens or nooks must be scaled to use a single large-growing plant for accent.

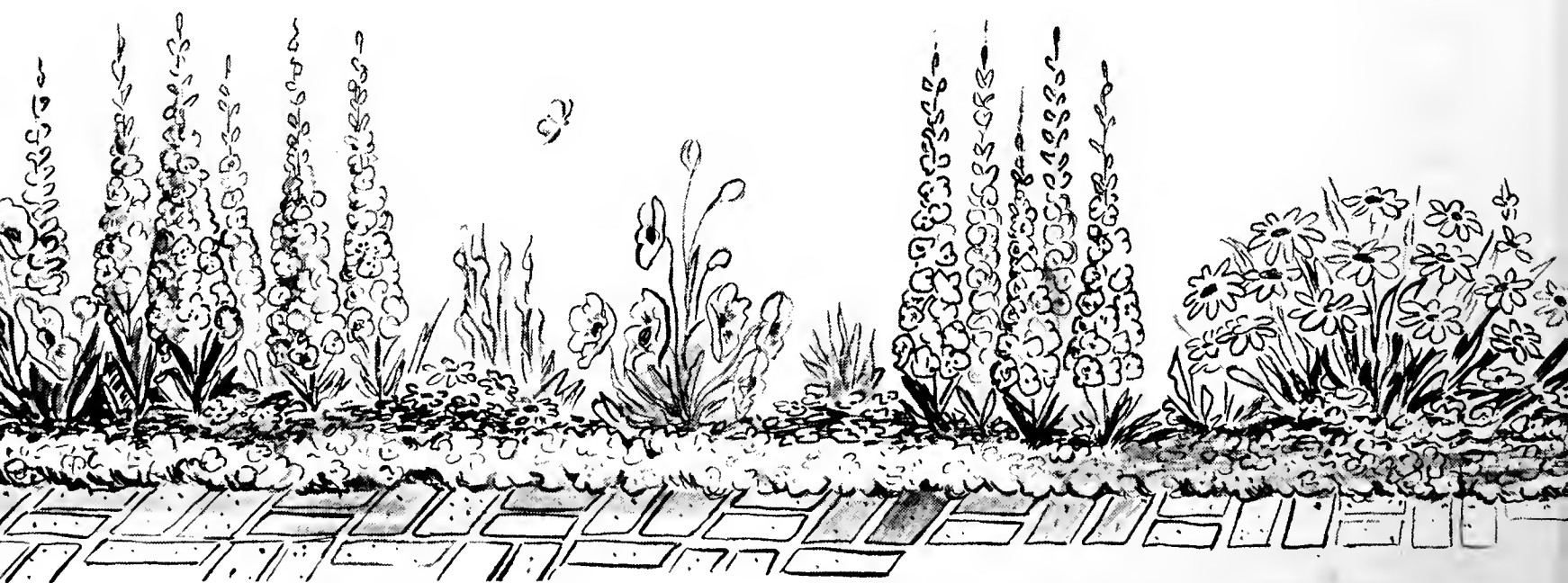
Like cosmonauts certain plants are more compatible. Their flowers or foliage complement each other in color, form and texture. While color and height are significant, equally important are texture and shape to prolong interest after flowering. Picture the space partnership of Madonna lilies and clear blue delphiniums accented with 'Elsie Poulsen' floribunda roses, the early blooming clematis 'President' with the fine white peony 'Le Cygne' or Colorado male fern with Rocky Mountain columbine and 'Perry's' blue Siberian iris. Are you in orbit?

If your border has at least four hours' sunlight extend the blooming season over the longest period with delphinium, iris, peony, hardy phlox, day lily, hardy aster and chrysanthemum as key plants. These perennials lend character and accent, so select choice varieties. Study catalogs carefully. With the adoption of a standardized color wheel by plantmen throughout the nation, catalog descriptions have attained greater uniformity colorwise. If you're color cautious you

will want to grow an untried plant in a test area. If space is limited but your visions unlimited, try it now!

Unless your scheme involves merely one or two colors, the only limitations are avoiding strange contrasts such as scarlet-red with blue-purple. Many authorities use white as a peacemaker between colors to subdue them. Others insist white is an intensifier to be used as a separator or to arrest attention. The interpretation is yours. At any rate, greys and low-valued greens tend to harmonize hues and whites are pleasing both in the evening garden and cool, shaded garden.

Even in space gardens, plantings are not fashionable in circles, crescents or stars. "Drifting and Dreaming" is the theme. Let the dainty Virginia bluebells drift into bays of garden pinks and bleeding hearts; let 'Africa' phlox drift into groups of Shasta daisies. Are you dreaming? Then let's head back to the border. Drifts should be rather long and narrow with tall perennials flowing into the medium and even lower-growing bays to hide fading blossoms and foliage. With the disappearance of chiming bells or leopard bane in the spring let annual petunias take over. Balloon flowers, Shasta daisies or tall snapdragons will cover faded poppy foliage. Repetition of



drifts or large single specimens at regular intervals lends accent, unity and strength to a good border.

If you like, start planning at the back of the border. Include flowering shrubs for tall bloom in spring followed by delphinium, tall meadow rue, false indigo and hardy aster. Peonies, phlox, lilies, some day lilies and floribunda roses are among the many medium-height plants for the middle portion.

Put the edge on the border with plants of good enduring foliage. Coral bell, low veronica, perennial candytuft, hardy pink, blue fescue, all fulfill this requirement. If you prefer continued

color, supplement perennials with such annuals as alyssum, dwarf marigold, ageratum or verbena.

Are you ready for the test trial? Some warm winter day hie yourself to the planting area using markers to indicate each plant name and variety in its proper space. Not only can you visualize the appropriateness of your plan, but with these stakes you will facilitate the actual planting on count-down day in mid-April.

3 - 2 - 1 - zero!

May 15: "Blast-off almost perfect?"

"Roger, the plants are growing. The garden's under way."

* PERENNIALS

Scientific and Common Names	Height			Color				Time of Bloom			Good cut flowers	Stands shade	Very useful
	Tall	Medium	Border	White	Pink-red	Blue-purple	Yellow-orange	Spring	Summer	Fall			
<i>Achillea filipendula</i> (fern-leaf yarrow)	X						X		X		X		X
<i>Achillea millefolium</i> (common yarrow)			X	X	X				X		X		X
<i>Achillea ptarmica</i> (sneezewort yarrow)		X		X					X		X		X
<i>Aconitum carmichaelii</i> (monkshood)	X	X				X				X	X	X	
<i>Althaea officinalis</i> (marshmallow)	X			X	X					X		X	
<i>Althaea rosea</i> (hollyhock)	X			X	X		X			X			X
<i>Alyssum saxatile</i> (basket-of-gold)			X				X	X					
<i>Anchusa azurea</i> (Italian bugloss)	X					X				X			X
<i>Anemone hupehensis</i> (anemone)			X	X		X			X			X	
<i>Anthemis tinctoria</i> (hardy Marguerite)		X					X		X		X		
<i>Aquilegia caerulea</i> (Colorado columbine)		X				X			X		X	X	X
<i>Aquilegia hybrida</i> (hybrid columbine)		X		X	X	X	X		X		X	X	X
<i>Arabis caucasica</i> (Caucasian rock cress)			X	X				X				X	
<i>Artemisia lactiflora</i> (wormwood)	X			X						X			X
<i>Artemisia albula</i> (silver king wormwood)		X		X						X	X		X
<i>Asclepias tuberosa</i> (butterfly milkweed)		X				X	X			X			
<i>Aster spp.</i> (Michaelmas daisy)	X			X	X	X				X	X		X
<i>Baptisia australis</i> (blue false indigo)	X					X			X				
<i>Belamcanda chinensis</i> (blackberry lily)	X						X		X				
<i>Bellis perennis</i> (English daisy)			X	X				X			X	X	
<i>Boltonia latisquama</i> (violet boltonia)	X			X						X	X		X

*This table of perennial plants was adapted from a list prepared by the late M. Walter Pesman which was used as a class reference for planning perennial borders at the University of Colorado Extension Center.

Scientific and Common Names	Height			Color				Time of Bloom			Good cut flowers	Stands shade	Very useful
	Tall	Medium	Border	White	Pink-red	Blue-purple	Yellow-orange	Spring	Summer	Fall			
<i>Campanula carpatica</i> (Carpathian bellflower) .		X	X			X			X			X	
<i>Centaurea cyanus</i> (hardy cornflower)		X		X	X	X			X		X		
<i>Cerastium tomentosum</i> (snow-in-summer) . . .			X	X				X					X
<i>Ceratostigma plumbaginoides</i> (plumbago) . . .			X			X				X			
<i>Chrysanthemum</i> spp. (chrysanthemum)		X		X	X		X		X	X	X		X
<i>Chrysanthemum coccineum</i> (pyrethrum)		X		X	X				X		X		X
<i>Chrysanthemum maximum</i> (Shasta daisy) . . .		X		X					X		X	X	
<i>Clematis heracleifolia davidiana</i> (fragrant tube clematis)		X				X			X				
<i>Clematis recta</i> (ground clematis)		X		X					X				
<i>Convallaria majalis</i> (lily-of-the-valley)			X	X	X			X			X		
<i>Coreopsis grandiflora</i> (big-flower tickseed) .		X					X		X		X		X
<i>Delphinium elatum</i> (bee larkspur)	X			X		X			X	X	X		X
<i>Delphinium grandiflorum</i> (Siberian larkspur) .		X		X		X			X	X	X		X
<i>Dianthus</i> spp. (hardy pinks)			X	X	X	X		X			X		X
<i>Dianthus barbatus</i> (sweet William)		X			X	X		X	X		X		
<i>Dicentra spectabilis</i> (bleeding heart)		X			X			X				X	
<i>Dictamnus albus</i> (gas plant)	X			X	X				X		X		
<i>Digitalis purpurea</i> (common foxglove) (self-seeding biennial)		X			X	X			X				
<i>Doronicum caucasicum</i> (Caucasian leopard bane)			X				X	X				X	
<i>Echinops exaltatus</i> (Russian globe thistle) . . .		X				X			X		X		
<i>Eremurus robustus</i> (foxtail lily)	X				X		X		X				
<i>Erigeron aurantiacus</i> (daisy)	X					X			X		X		
<i>Eryngium maritimum</i> (sea holly)		X				X			X		X		
<i>Eupatorium rugosum</i> (hardy ageratum)		X		X		X				X	X		
<i>Euphorbia epithymoides</i> (cushion spurge) . . .		X					X	X	X				
Ferns, various		X	X					X				X	
<i>Gaillardia aristata</i> (blanket flower)		X			X		X		X	X	X		X
<i>Geranium grandiflorum</i> (lilac crane's-bill) . .		X				X			X				
<i>Geum chiloense</i> (Chile avens)			X		X		X		X				
<i>Gypsophila paniculata</i> (babie's-breath)		X		X					X		X		
<i>Helenium autumnale</i> (common sneezeweed) . .	X	X					X			X	X		X
<i>Helianthemum nummularium</i> (rockrose) . . .			X	X	X		X		X				
<i>Helianthus decapetalus</i> (thin-leaf sunflower)	X						X			X			
<i>Heliopsis scabra</i> (rough heliopsis)	X						X		X				X
<i>Helleborus nigra</i> (Christmas rose)		X		X		X		X				X	
<i>Heemerocallis</i> spp. (day lily)		X					X		X		X		
<i>Heuchera sanguinea</i> (coral bells)			X	X	X				X			X	
<i>Hosta</i> spp. (plantain lily)		X		X		X			X	X		X	X
<i>Iberis sempervirens</i> (evergreen candytuft) . . .			X	X				X					X
<i>Kniphofia uvaria</i> (red-hot poker)		X			X		X			X			
<i>Liatris punctata</i> (Kansas gay feather)	X	X				X				X			

Scientific and Common Names	Height			Color				Time of Bloom			Good cut flowers	Stands shade	Very useful
	Tall	Medium	Border	White	Pink-red	Blue-purple	Yellow-orange	Spring	Summer	Fall			
<i>Limonium latifolium</i> (wide-leaf lavender) . . .		X				X				X	X		X
<i>Linum perenne</i> (perennial flax)			X			X			X				X
<i>Lupinus regalis</i> (lupine)		X		X	X	X		X			X		
<i>Lychnis chalcedonica</i> (Maltese cross campion)		X		X	X				X				
<i>Lythrum salicaria</i> (loosestrife)		X			X				X				
<i>Macleaya cordata</i> (plume-poppy)	X			X					X				X
<i>Mertensia virginica</i> (Virginia bluebells)		X				X		X				X	
<i>Monarda didyma</i> (horse mint)		X			X	X			X		X		
<i>Myosotis scorpioides</i> (true forget-me-not) . . .			X			X		X					X
<i>Nepeta cataria</i> (catnip)			X			X			X				
<i>Oenothera missouriensis</i> (Ozark evening primrose)			X				X		X				
<i>Paeonia</i> spp. (peony)		X		X	X			X			X		X
<i>Papaver nudicaule</i> (Iceland poppy)			X		X		X	X					
<i>Papaver orientale</i> (Oriental poppy)		X		X	X		X		X			X	X
<i>Penstemon</i> spp. (beardtongue)		X		X		X			X		X		
<i>Phlox paniculata</i> (perennial phlox)		X		X	X	X				X	X		X
<i>Phlox divaricata</i> (sweet William phlox)			X				X	X					X
<i>Phlox subulata</i> (trailing phlox)			X	X	X	X		X					
<i>Physalis alkekengi</i> (Chinese lantern)		X			X				X		X		
<i>Physostegia virginiana</i> (Virginia false dragonhead)		X		X		X			X				
<i>Platycodon grandiflorum</i> (balloon flower) . .		X		X		X			X				
<i>Plumbago indica</i> (leadwort)			X		X				X			X	
<i>Polemonium caeruleum</i> (Jacob's-ladder)			X			X			X			X	
<i>Polygonum bistortoides</i> (American bistort) . .	X			X						X			
<i>Potentilla recta</i> (sulfur cinquefoil)			X		X		X		X				
<i>Primula vulgaris</i> (English primrose)			X	X	X	X	X	X				X	
<i>Ranunculus repens</i> (creeping buttercup)			X				X	X				X	
<i>Rudbeckia speciosa</i> (showy coneflower)		X			X		X			X	X		
<i>Salvia azurea</i> (hardy blue sage)	X					X				X	X		X
<i>Saponaria ocymoides</i> (rock soapwort)			X		X				X				
<i>Scabiosa caucasica</i> (Caucasian bluebonnet) . .		X				X				X	X		
<i>Sedum spectabile</i> (stonecrop)		X		X	X				X				
<i>Sidalcea malvaeflora</i> (Greek mallow)		X		X	X				X				
<i>Solidago</i> spp. (goldenrod)	X						X			X			
<i>Stachys olympica</i> (lamb's ear)			X			X			X				
<i>Stokesia laevis</i> (Stoke's aster)		X				X			X	X	X		
<i>Thalictrum aquilegifolium</i> (columbine meadow rue)	X	X		X		X	X		X		X	X	X
<i>Trollius europaeus</i> (common globeflower) . . .			X				X	X				X	
<i>Valeriana officinalis</i> (common valerian)	X			X					X			X	
<i>Verbascum</i> spp. (mullein)	X			X	X		X			X			
<i>Veronica spicata</i> (spike speedwell)		X	X			X			X		X		X
<i>Viola cornuta</i> (tufted pansy)			X	X		X	X		X	X	X	X	X

The Conservation Library Center of North America

ARTHUR H. CARHART, Consultant

Conservation Library Center

ON JULY 1, 1963, the Conservation Library Center located at the Denver Public Library, was either 18 months or three years old.

The Center was three years old if we date its history from that day, August 1960, when Denver's Librarian, John T. Eastlick, and Arthur H. Carhart, discovered both had been thinking about the need for a repository containing the literature and lore of conservation and agreed to work together to establish such a "center." It was 18 months if we date the Center's beginning January 1, 1962, when a grant from the American Conservation Association became available.

Whichever may be the point of beginning, this reports the Center's progress.

The 460 lineal feet of shelf space assigned to the CLC, has only a few spaces not occupied. In some very limited sections are only several issues of a periodical, a few bulletins or a handful of mimeographed newsletters. But these are "seed." They represent a series of publications we may complete at a later date. Some items will be excluded because they are not pertinent to this Center; but this will happen only after they are carefully appraised as to their value. If not rightly part of this Conservation Center they

may be routed then to some other point of usefulness.

Other sections of these shelves are stuffed. One tier has not only shelves filled, but the top carries a load of materials to be sorted, appraised, classified. This 460-foot long "seed bed" of the Conservation Library Center is becoming crowded.

What does this "seed bed" of the Conservation Library Center contain?

On July 1, 1962, 112 persons or organizations had sent various items to the CLC. Some sent limited offerings, but often rare ones. Others sent literally hundreds of items. Some sent diaries, some sent files of magazines, some sent books, some significant photos — a rich and varied array of gifts that forecast the sweep and worth of this Center.

As yet, the Conservation Library Center is not fully organized to serve those seeking information it contains. The accumulation of materials has been swift and considerable, specific funds had not been earmarked for cataloging and the immediate need was to keep record of the names of donors, what they have sent CLC and in the case of periodicals, set up another card file that lists what issues of magazines or journals are on hand, what issues missing. These card files are up-to-

date. The acquisitions are stored on the "seed bed" shelves by donors and soon the next step, cataloging, will be under way.

In spite of the collection being not yet organized as it will be, some visitors, seeking information, have come to the Conservation Library Center and by pointing out two or three specific groupings, letting these patrons do their own searching, they have found data they wanted — and were very appreciative.

The CLC has had extraordinary good mention in the pages of the *New York Times*, *Christian Science Monitor*, *Denver Post*, *Pasadena Star-Times*, *Detroit Free Press*, *Des Moines Register & Tribune*, *The Rocky Mountain News*, a number of other publications and a feature story appeared in the April issue of *American Forests*, publication of the American Forestry Association.

The "official staff" of the Conservation Library Center to date, has been limited to a consultant and a secretary.

With such a limited crew little could have been done without the cooperation that has been so abundant and continuous. The nation-wide cooperation of the many conservationists who had aided in building the first parts of the CLC has been indicated in the number of gifts received. But there is an area of cooperation that exists without which progress would have been slow and uncertain. This is the cooperation of all persons connected with and interested in the Denver Public Library.

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SEEDS OF WISDOM?

A WISE SELECTION of seeds of choice plants must be made in December to be ready for sale at the Denver Botanic Gardens Annual Plant Sale scheduled next May 9 and 10.

Comparing success and failure of varieties grown at our Botanic Gardens and in the Denver City Parks were Dr. A. C. Hildreth, Director; Joseph Oppe, Botanist-Horticulturist, and Mike Ulaski, Greenhouse Superintendent. These gentlemen aided members of Around the Seasons Club planning committee in early selection of seeds for plants grown especially for this sale.

Seeds of Wisdom: Plan now to purchase many of your plants from the plant list to be mailed you in the March *Green Thumb Newsletter*. Not only are the plants offered for sale choice for this area, but your choice to purchase at this sale will assure the continued growth of Denver Botanic Gardens.

? ? ? ? ?

Pete

Ponders

? ? ? ? ?



Dear Pete,

While browsing through the display of guest iris at Botanic Gardens last spring I was delighted with the outstanding bloom of Oriental poppies. In planning my perennial garden I'd like to include some of these majesties. Please tell me their names, where and when to get them?

Dee Lighted

Dear Dee,

Since we have about 53 varieties in our test garden I hesitate to guess which varieties delighted you.

According to Beverly Pincoski, keeper of the blooming records, 'Empress of India', deep scarlet and the intense 'Red Crinkles' with its crinkled petals caused much comment in late May. Blooming about that same time were 'Lavender Giant' and 'Lavender Glory', both with black basal spots and about 12 inches across. About May 15 bloomed the double clear orange 'Doubloon', peony-like and about seven inches in diameter.

'White Queen', large white with deep purple basal spots, 'Betty Anne', medium pink and 'Burgundy', medium-sized wine, bloomed in late May.

'Master Richard', coral pink, about 11 inches, bloomed near June 1 and



FEED BIRDS

'Pandora', salmon-pink with red basal spots, ended the season about mid-June.

Apparently poppies like our soil conditions. According to Mrs. C. J. Christensen, who has championed the virtues of these bold beauties for almost 20 years, poppies prefer full sun, good drainage in average garden soil with plenty of room for growth, two feet between plants. Plant after August 1.

While local nurseries offer many varieties, the sources of poppies being tested at our Botanic Gardens were Walter Marx at Boring, Oregon, and Wayside Gardens, Mentor, Ohio.

Dear Gardeners,

It's an all-mail world where this column is concerned.

Do you have an outdoor or indoor gardening problem, a question concerning native or cultivated plants, a helpful tip you'd like to share? Perhaps you have a personally-devised garden gadget that lightens your work. Please send your questions or suggestions to me, Mrs. Pete, 1550 Midge Road, Littleton, Colo. 80120.

Without your mail this frail fails.

Pete-the-Ponderer



IT'S A MAIL WORLD



EXOTICS OF COLORADO, *The Weeping Birch*

HELEN MARSH ZEINER

STRIKING AT THIS time of year because of its beautiful white bark, the weeping birch (*Betula pendula*) is one of our most outstanding ornamental trees. Its handsome bark and graceful shape give it great eye appeal, especially during the winter months.

Anyone, even the rankest amateur, can easily recognize this tree by its white bark and slender, pendulous, dark-barked twigs.

Small catkins may be present during the winter months. With the coming of spring, these enlarge and open about the time the new leaves appear.

We have three native birches in Colorado, but the weeping birch has come to us from Europe. Birches are, generally speaking, water-lovers and our commonest native birch is to be found along streams where it can be recognized by its reddish-brown bark

marked with lenticels and its slender twigs and catkins.

There are several horticultural varieties of weeping birch. They differ mainly in the leaves, some of which are very finely cut.

Although it is a very lovely tree, weeping birch has several disadvantages of which you should be aware. First, it is not an easy tree to establish. It is hard to transplant. The roots must not be permitted to dry out during the transplanting process. With some special care, however, weeping birch can be established here, as the many handsome trees to be seen in Denver testify. Weeping birch is sub-

ject to sunscald and the bark of young trees should be protected during the winter months. It is also subject to drought damage and should never go into the winter with the roots dry. It is resistant to cold so long as it is not too dry.

Weeping birch is subject to beetle damage and to birch borer damage. Untreated infestations may shorten the life of the tree.

In spite of these disadvantages, the weeping birch is so striking in appearance that it is certainly worth the effort of establishing and maintaining. It is truly an ornamental tree.

LEE CHAMBERS

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House Plants, *Their Care and Selection*

THE DENVER BOTANIC GARDENS will offer an unusual opportunity to interested persons to learn about the selection and proper care of house plants with a course of five sessions on the subject starting January 27, 1964.

Dr. Helen Marsh Zeiner will conduct the classes. She is very well known to readers of *The Green Thumb* magazine, a publication of Denver Botanic Gardens, for her articles on house plants and for her articles which appear in *The Rocky Mountain News* on this same subject.

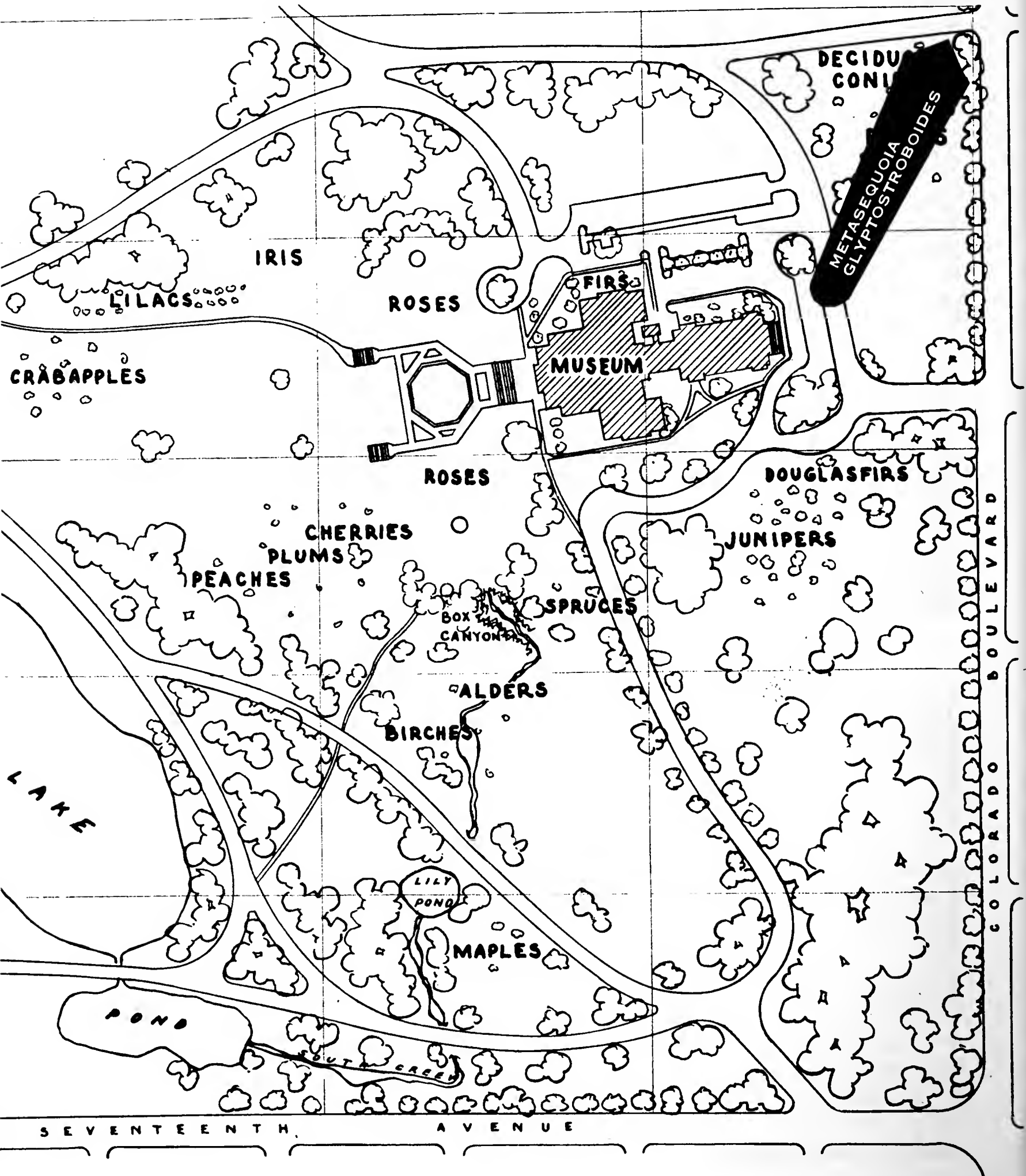
The dates for the five lectures are set for: January 27, February 3, February 11, February 17 and February 24, beginning at 2:00 p.m. and lasting approximately 1½ hours. The public is invited. A registration fee of \$4.00 will be charged to members of Denver Botanic Gardens, and a fee of \$5.00 will be charged to non-members.

This course, "House Plants, Their Care and Selection," will cover such subjects as the heat, light and moisture requirements of particular plants as well as proper methods of fertilization, correct methods of repotting and identification.

Interested persons are urged to telephone Botanic Gardens Hosue at 297-2428 or 297-2632 between the hours of 8:30 a.m. to 5:00 p.m., Monday through Friday. It is suggested that this be done as soon as possible because enrollment will be limited to 40 persons.

DENVER BOTANIC GARDENS

City Park Unit



Unusual Trees

in the Denver

Botanic Gardens

JOSEPH W. OPPE

THERE ARE TWO specimens of the dawn redwood (*Metasequoia glyptostroboides*) growing at the City Park Unit of the Denver Botanic Gardens. (See map for location.) The dawn redwood is a relative newcomer to the field of woody ornamental horticulture. It was first described in 1948 by Drs. W. C. Cheng and H. H. Hu, Chinese botanists, from living material collected in Szechuan and Hupeh Provinces in China. Prior to this, *Metasequoia* had been described and was known to exist only in the Mesozoic fossil flora of Korea and Japan.



Dawn redwood growing in City Park Unit.

In 1947, the Arnold Arboretum financed an expedition to collect seeds of this unusual tree. In January, 1948 the first seed arrived in this country. Seed from this original shipment was distributed throughout the world. The origin of most of the existing specimens can be traced back to this original shipment of seed.

A member of the bald cypress family (*Taxodiaceae*) the dawn redwood is characterized by its deciduous, two-ranked, opposite leaves which resemble those of the bald cypress (*Taxodium*). In the wild state, the dawn redwood grows to a height of 115 feet, with trunk diameters of 6½ to 9½ feet at the base.

The City Park Unit specimens are the only ones in Denver with which the author is familiar. Originally, four plants were received from the Arnold Arboretum in 1954. In the spring of 1957, all four specimens were trans-



Foliage of the dawn redwood.

planted from the Pinetum, south of the Museum Building, to their present exposed location. In July, 1960 two of the specimens died as a result of damage incurred during the spring freezes of that year. The two remaining trees are now eight and ten feet high.

The results of the City Park Unit trials have shown that the dawn redwood, when planted in an exposed location, is highly susceptible to damage as a result of sun-scalding. In addition, all the specimens, at one time or an-

other, have shown symptoms of chlorosis. This chlorotic condition was easily overcome by treating the affected plants with an iron chelate compound.

Based on the above conclusions, it would seem that the dawn redwood has but limited value as an ornamental tree in the Denver area. If planted in protected locations, such as to the north of a building or group of plants, it might be expected to do better than when planted in exposed sites.

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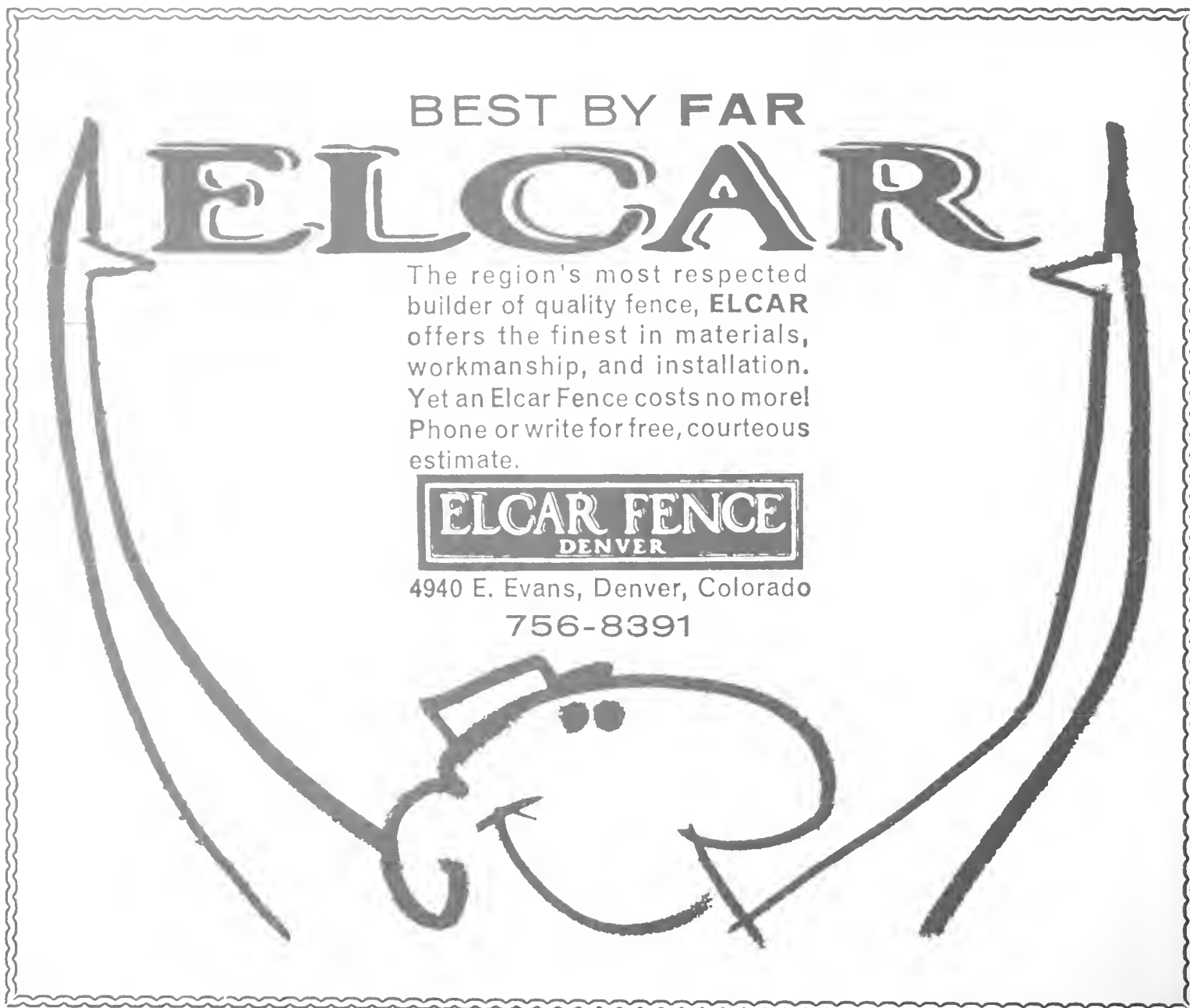
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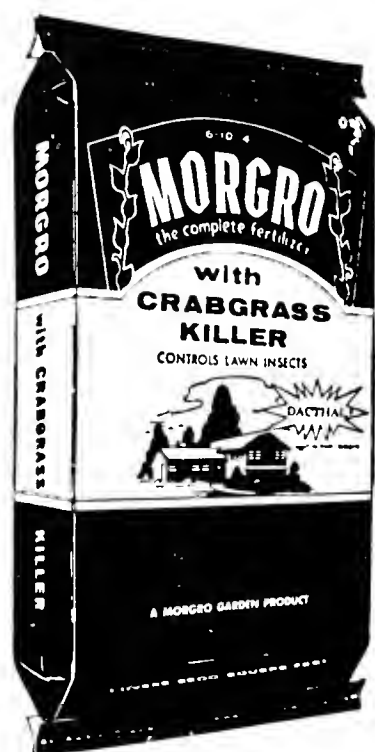
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Vol. 21

No. 2



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THE COVER

Echinocereus Triglochidiatus
THE KING'S CROWN

Photograph by
Edward S. Wrench

COLORADO
CACTOPHILES



WHO? WHAT? WHY?

By their grotesque beauty, by their orchid-rivaling blossoms, by the heroic history of their indomitable will to survive, the cacti have intrigued thousands of botanists and just ordinary green thumb folk into a love for them that surpasses the understanding of anyone who does not share the affection. These cactus lovers form national cactus associations in every country in the world and local clubs in thousands of cities, towns and villages in those countries.

In Denver, the organized society is the COLORADO CACTOPHILES, affiliated with the National Cactus and Succulent Society of America and Denver Botanic Gardens, Inc.

Monthly meetings are held at Botanic Gardens House. Various genera and species of cacti are discussed under leadership of some member thoroughly competent and familiar with the plant under discussion, its culture, possibilities and limitations. Field trips to habitats of Colorado cacti for limited collecting, social meetings at the homes of members and picnic meetings are arranged during the summer months.

A plot at the York Street Unit of Denver Botanic Gardens is planted with Colorado native cacti and cared for by Colorado Cactophiles in order that local and out-of-town visitors may become acquainted with some of Colorado's earliest settlers.

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The purpose of preparing this special edition of *The Green Thumb* was not to present the native cacti of Colorado as botanical oddities with unpronounceable Latin names. Nor was this issue compiled to describe these cacti in the scientific terms so dear to the expert but which mean so little to the amateur. Rather, the purpose has been to introduce the native cacti as individuals with personalities and characteristics of their own.

If reading this issue brings you to a closer understanding of the cacti, inspires in you a desire to know them better, possibly awakens in you some spark of the affection and love we feel for "our" cacti, we can write "mission accomplished". — COLORADO CACTOPHILES

ACKNOWLEDGEMENTS

This issue has been made possible by the work and contributions of Cactophiles members:

Alvin Lee Chambers	Rev. Paul Holland
Elizabeth Eckstein	Ethel Karr
Mary Ann Heacock	Edgar Sherman
Sylvia Hewlett	G. J. Tomlin

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and many anonymous contributors to the Denver Cactus and Succulent Society's Journal, *Spine Spiels* (1949-1951).

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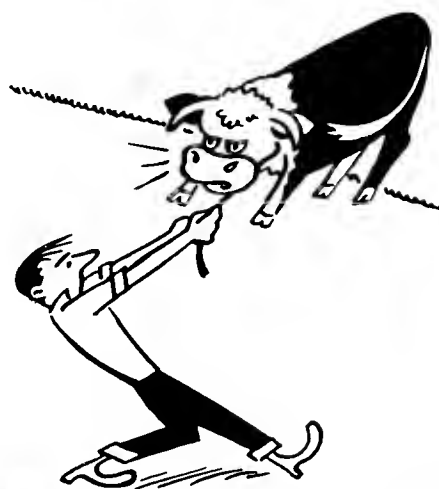
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The Cactaceae

THE CACTUS FAMILY is a large one. It is so large and diversified that it is divided into three tribes and one of these is subdivided into seven subtribes. There are about 1,700 named species of cacti (this number varies according to the author quoted). At first glance this seems to be an overwhelming number with which to become embroiled. However, since the plant kingdom has over 600,000 species, the Cactaceae encompasses only a very small percentage of the plants of the world.

One of the many interesting things about cacti is that they are, with one exception, native only in North and South America. The one exception is the genus *Rhipsalis* which is confined to Africa and Ceylon. The more one thinks about this exception the stranger it seems. This segregation of cacti is repeated in many ways. For example, here in Colorado *Opuntia arborescens* does not grow north of a point located approximately 20 miles south of Colorado Springs. Other species are confined to the east or west of the Continental Divide. One wonders why? They do quite well when introduced in other places and have actually become a serious problem in Australia where they have escaped from cultivation.

Cacti are found from the rain forests of South America all the way north into Canada and from the hot deserts

of Mexico and southwestern United States to the mountains of Colorado. They vary in size from the giant saguaro, which may be 50 feet or more high, to tiny ones that must be searched for on the hands and knees. There are, of course, those with horrible spines which can maim animals while others have only tufts of small hair.

Cactus spines run the gamut from tough, curved hooks that can be used for fishing, to thin paper-like blades that are harmless, to minute spines that require tweezers and a magnifying glass to rid one of their painful presence. Some even have each spine in a separate sheath that comes off easily. Others rely on mimicry to avoid detection and blend so well with gravel beds that they are called "living rocks". The variety seems almost endless.

The spines are clustered in areoles arranged spirally on fleshy stems. Sometimes a careful examination must be made in order to detect this spiral arrangement. Again, some cacti have no spines, while still others are woody, shrub-like plants or even vines. Since these cactus-like characteristics are not always present, how do we know which plants are cacti?

The distinguishing features of cacti are:

All cacti have areoles and only cacti have them. Most cacti are succulent but not all succulents are cacti. The

final test is, of course, the flower. The sepals and petals are numerous and gradually merge from one to the other. The pistil consists of several stigmas, a single style and an inferior ovary. The single seed chamber has marginal placentae.

Twenty-five species of the Cactaceae are native to Colorado. One species recently named is a good example of plants which have a very limited range. *Coloradoa mesae verdae* is found only in the arid region from which it takes its name. The new genus *Coloradoa* was created to incorporate this rare species of cactus but some authorities feel it should have been placed in the genus *Echinocereus*. The *C. mesae verdae* is a drab little fellow, about the size of an inverted tea cup, whose main claim to fame is its rarity.

The largest of the tribes, Opuntieae, with about 600 species, is represented in Colorado by 12 species. The large, showy blossoms of these species may be purple to rose, pink, yellow and orange. The size varies from the largest in the state, the tree cactus, *Opuntia arborescens*, up to 6 feet high and bush shaped, to the dwarf cactus, *O. schweriniana*, with pads smaller than a match book.

Another tribe, Cereeae, is represented in Colorado by three subtribes: Echinocereanae (6 species), Echinocactanae (3 species) and Coryphanthanae (3 species).

The Cereeae are usually separated from the Opuntieae by being called "ball" cacti. Here again, diversity is

the most noticeable aspect. The huge beehive cactus, *Echinocereus roemerii*, has white, showy spines which emerge from a mass larger than a bushel basket and is composed of many heads. It can be grown in harmony with the little hen and chickens, *E. viridiflorus*, that measures only 1½ by 2 inches per head and a large clump can easily be covered by a dinner plate.

The third tribe, Pereskieae, is found only in the tropics where moisture is plentiful.

The methods of collecting cacti are rather simple. They transplant readily and thrive on treatment that would kill other plants. For example, it is best to transplant them with bare roots and let them dry for a few days before replanting them. Cactus culture and descriptions of the different species are covered in other articles in this issue.

There is only one more bit of advice. When you meet a cactus, don't shake hands, just bow and keep a respectful distance. —LEE CHAMBERS

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Hos'n-te-le, Man-uv and Satz

ALL OF THE TWELVE species of *Opuntieae* native to Colorado, while different in many other ways, fall into two groups: the *Cylindropuntias*, round-stemmed, of which there are three, and the *Platyopuntias*, flat-stemmed, which account for the remaining nine species.

Navajos call all *Opuntias* "hos'n-te-le". Utes call the pink flowered *Opuntia* "man-uv" and the yellow flowered, "satz". Other names were given these cacti by the Spaniards and the early settlers and some carry individual names given to them by the Indians.

Opuntia arborescens (cane cactus, candelabra cactus, velas de coyote, foconoztle) is one of the most ornamental cacti found in Colorado. It grows abundantly on the southeastern plains and on the mesas and foothills 20 miles north of the Arkansas River to about the same distance east and south of Pikes Peak.

Growing 3 to 6 feet high, with stems $\frac{1}{2}$ to $1\frac{1}{2}$ inches in diameter, *Opuntia arborescens* each year grows three or more new joints at the tips of old growth. Barbed spines are white or brownish, encased in a yellowish paper-like sheath, $\frac{1}{4}$ to $\frac{3}{4}$ inches long and vicious regardless of size. When the



Opuntia rutila

stems are broken, there is a noticeable odor of witch hazel. The branches are erect in summer but droop when the plant is dormant. Flowers are purplish to rose-pink and are most abundant during the first week of June. The yellow fruit remains attached to the stems until forced off by new growth.

This species is adaptable and will thrive under cultivation practically any place. However, for some unknown reason it has never been found growing wild in any other part of the state except that designated as its natural habitat. Large plants are difficult to transplant but collected seedlings are easy to grow. Propagation from seeds or cuttings is not difficult.

Opuntia davisii (rat-tail, sticker cactus, hosh-tit-sah-yi) was discovered by George Engelmann about 1850 and named in honor of Colonel Jefferson Davis, at that time U. S. Secretary of War. It is a close relative of *O. arborescens*, yet the relationship seems to involve more of contrast than of likeness. It always has yellow flowers and retains the characteristic hard, yellow fruit until it is forced off by new growth. In addition, it has one long, deflexed spine, $\frac{1}{4}$ to $\frac{5}{8}$ inches long, surrounded by several regularly arranged shorter spines and bristles. The brownish spines have the yellowish, straw-colored sheath which confirms the relationship. *Opuntia davisii* is a native of the extreme southwestern part of Colorado and does not grow naturally anywhere else. Like *O. arborescens*, it is adaptable, grows well in the hardy cactus gardens and begins flowering in mid-June and continues for a week or ten days.

Opuntia clavata (silver clusters, icicle cactus) while thriving in Colorado gardens is probably not a native. Chances are, it is an invader from New Mexico, where it is found in abundance on the slopes of the Sandias, near Albu-

querque and in other places. *Opuntia clavata* is the "missing link" between the *Cylindropuntia* and the *Platypuntia*. The joints are cylindrical, short, about $1\frac{1}{4}$ inches in diameter and 2 inches long. The aerial portions are prostrate and spread to form large, ground-clinging patches rather than the tree-like shapes characteristic of the *Cylindropuntias*. Areoles are numerous, with white wool and bristles. Spines are flat, white, about $1\frac{1}{8}$ inches long and all point downward. The peculiar shape and broad, pure white spines make *O. clavata* an attractive specimen. The yellow blossom is not unattractive but the bright yellow glistening fruits, $\frac{3}{4}$ by 2 inches long, are abundant, long-lasting and very conspicuous. —ELIZABETH ECKSTEIN

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THE HARDY CACTUS BED

There are so many successful winter hardy cactus gardens throughout the United States that to list and describe them all would be impossible. All of them have in common a method of construction suitable for a winter hardy cactus bed in practically any location, with possibly a few simple modifications to meet different lays of the land.

Where rainfall is slight, some facility for irrigation will be necessary. Where rainfall is excessive, provision for ample drainage must be provided. If the question of too little or too much rainfall is undeterminable, it is well to construct an excessive rain type bed and apply water liberally when needed. Success with hardy cacti in a well-drained bed is attested by many years of growing and flowering the hardy

species without protection in New York, New Hampshire, Pennsylvania, Wisconsin and many other places where winter temperatures are severe.

On a slope facing any direction except north, where water will drain away rapidly, excavate to any convenient length and width a bed not less than 18 inches deep. Lay drain tile carefully so water will never collect. Cover with a 6-inch layer of coarse gravel or broken brick. Then refill excavation with topsoil mixed with well decomposed leaf mold or naturally rich, gravelly garden soil, level with the surrounding ground or somewhat higher to allow for settling.

When level land confronts the cactus gardener, construction is much different. Unless there is considerable slope

it is impossible to lay drain tile successfully. Any sort of an excavation under such circumstances, especially in heavy soil, would be a storage pit for excessive water. Capillary action alone would keep the bed sopping wet for many days, although the surrounding ground might be bone-dry. Cacti in such a bed are doomed to death.

Dig no pit; build up. Starting at ground surface level, build a frame or wall from 1½ to 2½ feet high. Build with timbers, brick, rocks or whatever material is at hand, leaving cracks and crevices in the wall to allow water drainage and to allow air to reach roots. In such a planter, a larger proportion of gravel in the soil with which it is filled is recommended. Mound up above the walls. A slight slope from center to sides may prove advantageous. After the soil is settled fill in depressions.

In planting the outdoor beds, use the same care and precaution as when planting indoors. Handle plants gently, spacing them some distance from each other and water just enough to settle soil about the roots. Do not soak. Do not pack soil too firmly about the stem. Now, as never before, roots need air to heal breaks and abrasions. Again, do not flood with water as excessive moisture about roots, at this time, will cause roothairs and possibly roots and stems to rot.

The use of large stones, driftwood, bones or other "landscaping" material is a matter of individual choice. Some hardy cacti do need a little shade but such shading may be done by planting that species where it will be shaded by a sun-lover. The practice of adding gravel, crushed granite or marble or other chips to cover the surface of the hardy cactus bed is debatable. Such covering may hold moisture about the

base of the stem, where little, if any, is needed and certainly makes it difficult to observe closely the condition of the soil. Even with the greatest of care there is some danger in creating an "artistic" cactus bed.

A carefully constructed bed and the most painstaking care may not insure unqualified success with many cacti which might be considered hardy. No species of *Sclerocactus* will survive unless grown in gravelly soil almost devoid of leafmold. Some of the *Echinocereus* are very fussy about any excess moisture. A few of the *Opuntia* are also water testy but most of them take to a carefully constructed bed as a gift from Heaven and grow and bloom until the bed resembles a beautiful Persian rug. Some Texas and southwestern cacti, not considered cold hardy, can take zero temperatures for a considerable stretch of hard winter if perfectly dry and dormant when the zero weather strikes. Dryness is not the only factor which causes dormancy in cacti. Temperatures of 32° F. for several weeks will also convince them that their resting period has arrived.

— ETHEL KARR

—————><—————
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Colorado Cactophiles is an organization of cactus lovers dedicated to increasing interest in, knowledge of and preservation of cacti and all desert plants in their native habitat.

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The Echinocereus Twins

WHICH OF THE TWO look-alike *Echinocereus* has the “toniest” spines? *Echinocereus viridiflorus*, of course! This twin’s spines are two-toned, sometimes even three-toned. Although much smaller, the colorfulness of *E. viridiflorus* makes it a fair rival for *E. rigidissimus*, the rainbow cactus of Mexico and Texas. Its yellowish-green flowers are inconspicuous but have a distinctive fragrance and appear about the base of the plant in a circle, giving it an appearance of a “hen and chickens” (its common name).

On the other hand, *Echinocereus caespitosus*, with similar but not so colorful spines, leads a mousey life most of the year. In early June it has its day (quite literally) and makes up for all the colorless months by producing a halo of rose-purple blossoms, up to 3 inches across, which last but one day.

As with humans, their personalities are also very different. While one attempts to be passably attractive at all times, the other prefers to conserve all its energy for one grand splurge.

Echinocereus caespitosus is considered quite rare. Its habitat is confined to a small area bordering the Arkansas River in the far southeastern part of the state. Look for a green, cylindrical stem 2 to 6 inches tall with approximately 13 ribs studded with white and

appressed spines that do not overlap. The spines are so harmless that the plant may be handled without gloves. There are no central spines. Rodents and other herbivorous animals take advantage of this lack of spine protection, which may account for the scarcity of the species.

Drab and unnoticeable throughout the year, its one burst of spectacular bloom in June makes *Echinocereus caespitosus* well worth-while. The flowers are a deep rose-purple and 3 inches in diameter. Three to five blooms stand upright and proud at the top of the stem, for a single day of glory, giving it the common name of purple candle.

By contrast, *Echinocereus viridiflorus* has a wide range, covering most of the eastern part of the state. About the same size and shape as its twin, *E. caespitosus*, its 13 ribs are frequently spiraled, its areoles bristling with colorful, variegated lateral spines and a central spine noted for its ferocity.

The blossoms of *Echinocereus viridiflorus* are only about 1 inch in diameter and circle the body like a girdle of yellowish-green silk. A subtle lemon fragrance adds to their fragile charm. The flowers are inconspicuous but lovely and this, when combined with the rainbow spines, makes a welcome addition to any garden.

—ELIZABETH ECKSTEIN

OLD MAN GRIZZLY BEAR

The "old man" of the flat-stemmed Opuntiaeae is the grizzly bear or wooly cactus, *Opuntia trichophora*. The growth form of this cactus is spreading, rather than erect and the flat, 4-inch long stems are covered with large areoles scarcely $\frac{1}{4}$ inch apart. From each of these areoles there grows 6 to 12 slender white spines up to 3 inches long. The spines have no definite arrangement except that all are deflexed. On the lower areoles the spines are often much elongated and hair-like and up to $4\frac{1}{2}$ inches long. Flowers may be yellow or pink. The fruit is small, dry and hard and covered with numerous sharp spines. These spines cling until completely withered and then the fruit breaks to spread its unseemingly large seeds.

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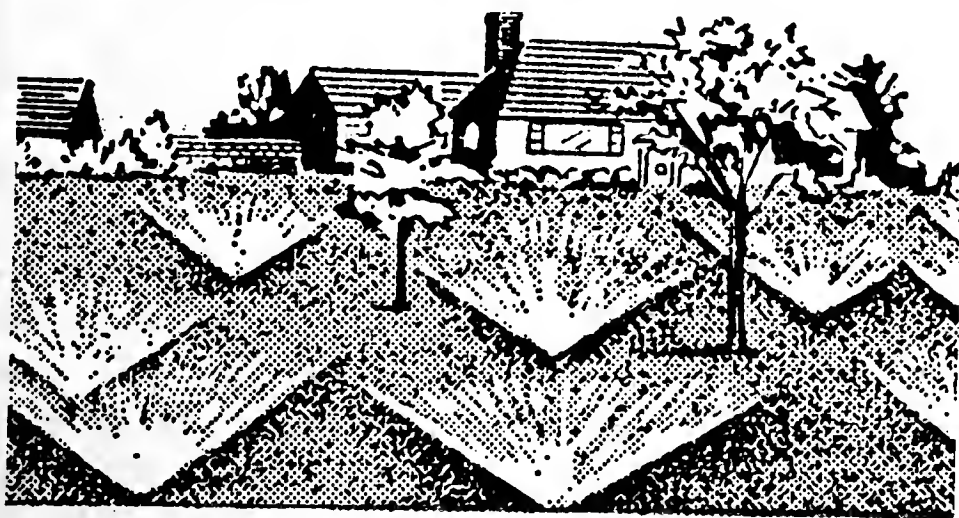
THE COMELY PORCUPINE OF CORTEZ

Bristled like a porcupine, which using some imagination it resembles, *Opuntia hystricina* inhabits a small territory in the southwestern part of the state. The long spines, white and brown intermingled, point in all directions but mostly downward. The flowers are reddish-orange, yellow or rarely pink. The fruit is elongated, dry and spiny, with stout brown-tipped white spines appearing abundantly upon the top half. *Opuntia hystricina* is one of the more attractive *Platyopuntias*. One type with pink flowers, which have purple stamens and green stigmas, is especially beautiful but another type with slender black spines and dusky orange flowers is a close rival.

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The Gophers' Banquet Table



Opuntia fragilis

TO THE SUPERFICIAL observer there is little difference between the two juicy-fruited *Platyopuntias*, *Opuntia phaeacantha* and *O. rafinesquei*. Nevertheless, they are two distinct species in habitat, size, reaction to environment and shape of fruit.

Opuntia phaeacantha grows abundantly on the eastern plains and on the western slope. *Opuntia rafinesquei*, native to the eastern plains, has never been able to cross the Rocky Mountains unassisted by man. *Opuntia phaeacantha* is lower growing and inclined to sprawl and where *O. rafinesquei* remains small in dry locations or in unfavorable seasons, *O. phaeacantha* flourishes through drouth or unseasonable weather. The fruit of *O. phaeacantha* is pear-shaped while that of *O. rafinesquei* is ovoid. The flowers of both attract attention and are predominantly yellow or orange on the eastern plains but on the western slope, while the color of transplanted *O. rafinesquei* is fixed, the flowers of *O. phaeacantha* run the gamut of transitional colors with many of the pinks included.

The juicy fruits (commonly referred to as prickly pears) of either species were used by the Indians and early white settlers as food; eaten raw or as

a conserve. In times of great scarcity of food, cattle have been known to eat the green pads. How they manage the barbed bristles and stiff spines is a mystery, although the spines are sometimes burned off by the ranchers. Rabbits relish the ripe fruit. The flowers are a great delicacy for the gophers, which may frequently be surprised sitting on their hind paws enjoying a tasty repast at their cactus banquet table.

These two species are the last of the Colorado *Platyopuntias* to flower, opening, usually, the last week in June. The red fruits ripen in September and if not harvested by humans or eaten by rodents, remain attached to the pads sometimes until the following spring.

Opuntia phaeacantha (New Mexican prickly pear). Described by George Engelmann in 1849. Habitat: southeastern plains, north to the Arkansas River and the western slopes of the Rocky Mountains, north to Grand Junction. A spreading cactus with flat, obovate joints 4 to 6 inches by 4½ to 8 inches. Areoles 1 to 1½ inches apart; one to three spines, 1¼ to 1½ inches long, brown or variegated on all areoles or on upper half of stem; flowers 2½ to 3 inches, yellow, orange or pink with eight to ten yellow stigmas;

fruit clavate to ovoid, 1½ to 2½ inches, purplish-red, juicy, edible; seeds flat, irregular, ⅜ inches in diameter.

Opuntia rafinesquei (prickly pear, prairie rose) was definitely established as a species in 1859, after it had been given many names by earlier botanists. Linnaeus first recorded it as *O. opuntia* and later, in 1753, as *Cactus opuntia*. Rafinesque, himself, named it *O. humifusa*. Also discarded are the designations *O. mesacantha*, *O. tortispina*, *O. camanchica* and possibly others. Habi-

tat: Colorado, east of the Continental Divide. Spreading, joints obovate, flat, from 3 by 4 inches to 3¼ by 4½ inches. Areoles, ⅝ to 1 inch apart; one to three spines, ¾ to 1½ inches on areoles on upper third of stem, rarely more, white, yellow, brown or variegated; bristles in all areoles. Flowers, yellow through orange, 3½ to 4 inches with 9 to 11 greenish-yellow stigmas. Fruit, ovoid to clavate, reddish purple, juicy and edible. Seeds, flat, irregular, about ⅜ inches long.

— ELIZABETH ECKSTEIN



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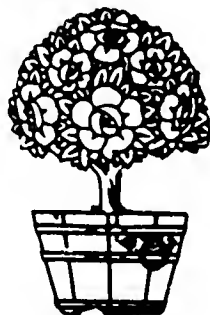
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The Three Sisters

CEREEAE IS REPRESENTED in Colorado by the subtribes Echinocereanae, Echinocactanae and Coryphanthanae. This article is confined to three closely related members of the Echinocereanae, namely: *Echinocereus triglochidiatus*, *E. coccineus* and *E. roemerii*.

Echinocereus triglochidiatus is sometimes called king's crown or strawberry cactus. It is found in the southeastern part of the state and in some places on the western slope. Although not found in its natural state in the northern part of Colorado, it survives well when transplanted to Denver and is a valuable addition to the outdoor cactus garden.

This cactus is of the clustering type and will form large mounds. The joints are dark green; ovate to cylindrical, 4 to 6 inches long and about 2 inches in diameter. It has six to eight undulant sharp ribs with sparse, round areoles carrying white wool when young and three to six (mostly three) straight, compressed ash-colored spines, angular and more or less reflexed. The regular spines with sharp edges serve to differentiate it from all other *Echinocereus*. Sometimes the central spines are almost black.

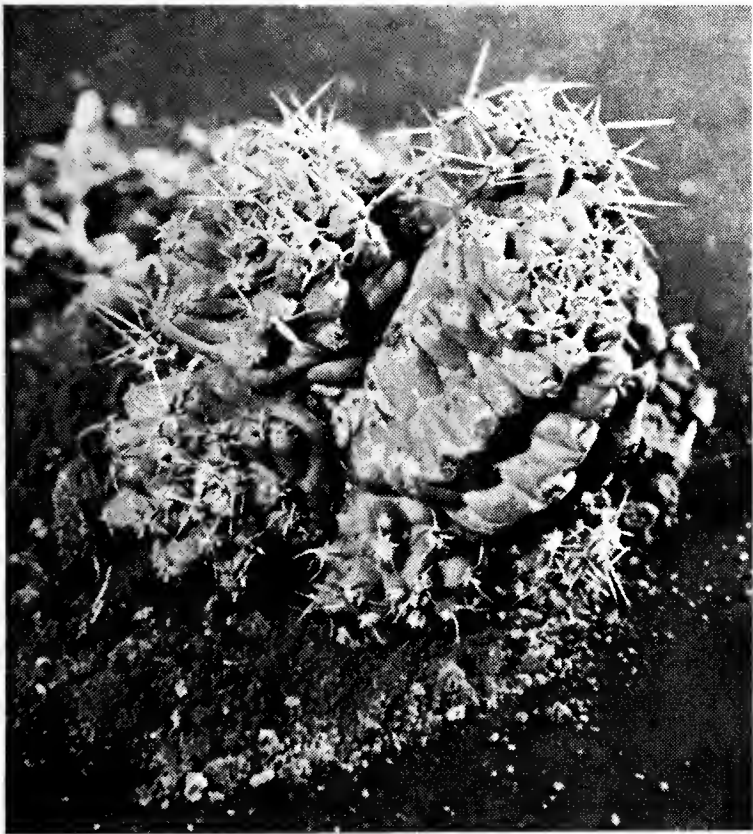
The flowers are a deep scarlet or dark red on most plants but some will vary toward purple. The flower is

about 2 inches across and 3 inches long, has 9 to 12 green stigmas, purple stamens and yellow pollen. The fruit is red and juicy, with black seeds. The flower is borne on the ribs at the spine-bearing areoles, just above the spines. It is very free-flowering and a large mound may be completely covered with beautiful dark red flowers during the first part of June.

Echinocereus triglochidiatus transplants well and thrives in diverse soils. Transplanting large mounds will tax the ingenuity of the cactus enthusiast who must try to remove it without having too close contact with the sharp spines. However, after it is established in the garden and comes into full bloom, the prick of the spines is soon forgotten.

Echinocereus roemerii, commonly called the beehive cactus, forms large mounds similar to *E. triglochidiatus*. The individual joints are light green, 2 to 6 inches long and about 2 inches in diameter. The nine ribs are smooth and do not show that they are composed of fused tubercles. Some specimens may have only eight ribs, others ten. *Echinocereus roemerii* generally has ten lateral spines which are gray or yellow and from $\frac{3}{4}$ to 1 inch long. There are nearly always four central spines arranged in the form of a cross. These are longer and stouter than the

radials and are darker in color, dark brown at the base and shading to yellow at the tips. All of the spines of this cactus are round except the lower central one, which is flattened, almost carinated.



Echinocereus coccineus inermis

The flowers are orange-red, 2 inches across and 2½ inches deep, with 9 to 12 green stigmas, purple stamens, yellow pollen, red juicy fruit and black seeds.

This cactus is found in the southeastern part of the state as well as in the western and northwestern. It also does well when transplanted to the Denver area. In the garden, its light green joints with dark central spines contrast well with the dark green bodies and gray spines of *Echinocereus triglochidiatus*.

Echinocereus coccineus is the third of the mound-forming trio. It is similar to the other two in that they all have red or orange-red flowers with green stigmas, purple stamens, yellow pollen, red juicy fruit and black seeds. It differs in the length and arrangement of spines and in the color of the

spines and joints. *Echinocereus coccineus* has nine ribs (may vary from eight to ten), that seem to be partly fused tubercles and areoles that are about ½ inch apart. There are nine lateral spines (seven to ten), one to three central spines about 1 inch long, slender, round and yellow or gray.

The flowers are orange-red, 2 inches across and 3 inches long and bloom very freely. Although generally quite similar to *Echinocereus triglochidiatus* and *E. roemerii*, *E. coccineus* has enough subtle differences to add contrast to the other two. All three must have had a common ancestor although they are classed as three distinct species. Some authorities have tried to divide each one still further into varieties but there does not seem to be sufficient justification for this except in the case of *E. coccineus inermis*, a spineless variety occurring only in a few places in western Colorado.

— G. J. TOMLIN

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Natives Not Endemic

THE DISTRIBUTION of cacti on the American Continent is limited by natural phenomena such as climate and altitude but are not affected by man-made boundaries. Cacti found growing naturally in Colorado are not endemic to Colorado. Many species which are native to Colorado are also found growing in New Mexico, Texas, Wyoming, Utah, Nevada, Arizona and the Dakotas.

In his authoritative monograph, *Colorado Cacti*, published in 1940 by Abbey Garden Press, Dr. Charles S. Boissvain designated and described 26 cacti as native in Colorado. These spe-

cies of *Opuntia*, *Echinocereus*, *Echinocactus* and *Coryphantha* are found growing in many environments from the semi-arid plains to the high mountains. In the plains country they grow with a minimum of rainfall, under torrid sun in summer and sub-zero cold and blizzards in the winter. In the higher elevations some species may be covered with snow for six or eight months out of the year.

In the following listing of native species, the numerals in parenthesis refer to the page number in Borg's Cacti where the species is described:

OPUNTIEAE

Cylindropuntia	Platyopuntia
(109) <i>Opuntia arborescens</i>	(96) <i>Opuntia phaeacantha</i>
(106) <i>Opuntia davisii</i>	(97) <i>Opuntia rafinesquei</i>
(111) <i>Opuntia clavata</i>	(87) <i>Opuntia schweriniana</i>
	(80) <i>Opuntia polyacantha</i>
	(80) <i>Opuntia trichophora</i>
	(80) <i>Opuntia hystricina</i>
	(81) <i>Opuntia rhodantha</i>
	(79) <i>Opuntia fragilis</i>
	(—) <i>Opuntia rutila</i>

ECHINOCEREANAE

(219) <i>Echinocereus triglochidiatus</i>	(220) <i>Echinocereus caespitosus</i>
(219) <i>Echinocereus coccineus</i>	(221) <i>Echinocereus viridiflorus</i>
(219) <i>Echinocereus coccineus inermis</i>	(225) <i>Echinocereus fendleri</i>
(221) <i>Echinocereus roemerii</i>	

ECHINOCACTANAE

(332) <i>Sclerocactus whipplei</i>	(67) <i>Pediocactus simpsonii</i>
(—) <i>Coloradoa mesae verdae</i>	(67) <i>Pediocactus simpsonii minor</i>

CORYPHANTHANAEE

(357) <i>Coryphantha vivipara</i>	(363) <i>Neobesseya missouriensis</i>
(357) <i>Coryphantha radiosa</i>	

Just as the Colorado native cacti will adapt where environment may be approximated, so will many of the species found in other states adapt themselves to outdoor gardens in Colorado.

There are a large number of cacti which might be considered natives of warmer climes which have proven hardy in Colorado's more rigorous climate.

—SYLVIA HEWLETT

A KISSING COUSIN FROM MISSOURI

The representatives of the Coryphanthanae in Colorado are two very close relatives, *Coryphantha vivipari* and *C. radiosa* and a kissing cousin, *Neobesseyia missouriensis*. The latter differs from the former in that its scarlet berries ripen the following spring after blooming, while the blossoms of its two cousins are followed by green berries ripening in from one to two months.

Neobesseyia missouriensis is well distributed throughout the foothills and mountain regions on both sides of the Continental Divide but is not actually plentiful in any one locality. Sometimes it ventures out onto the open plains but prefers the shade of low shrubs and perhaps the more plentiful moisture found closer to the hills.

The Missouri cactus (*Neobesseyia*) is globose with stems rarely over 3

inches high by 2 inches wide, slightly flattened on top; tubercles grooved on upper side; areoles woolly; 9 to 20 radial spines, gray with brown tips, often bent, a central spine rarely present. Flowers are primrose yellow, fragrant, rarely over 1 inch across. The red fruits, one of the plant's attractions, pop up in great profusion in April and remain until mid-May.

In its Colorado habitat *Neobesseyia missouriensis* rarely forms clusters but will cluster under special conditions in the wild and frequently in the cactus garden.

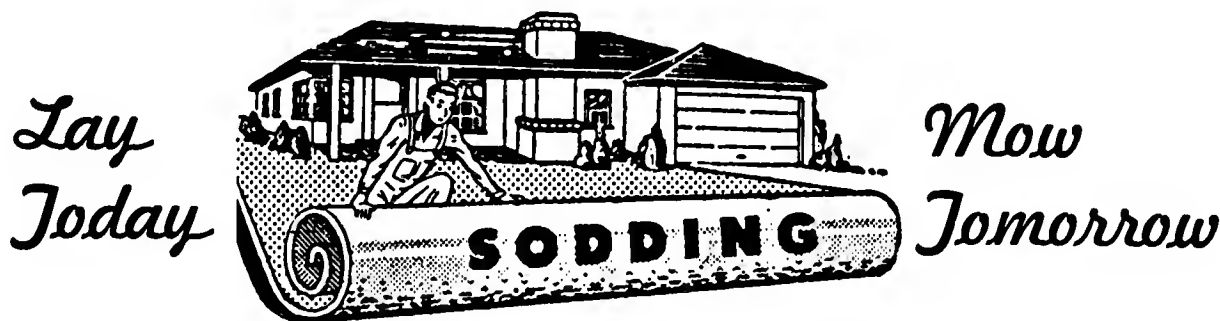


MEETINGS

Monthly meetings of Cactophiles are held the fourth Sunday of each month in Botanic Gardens House. Guests are welcome.

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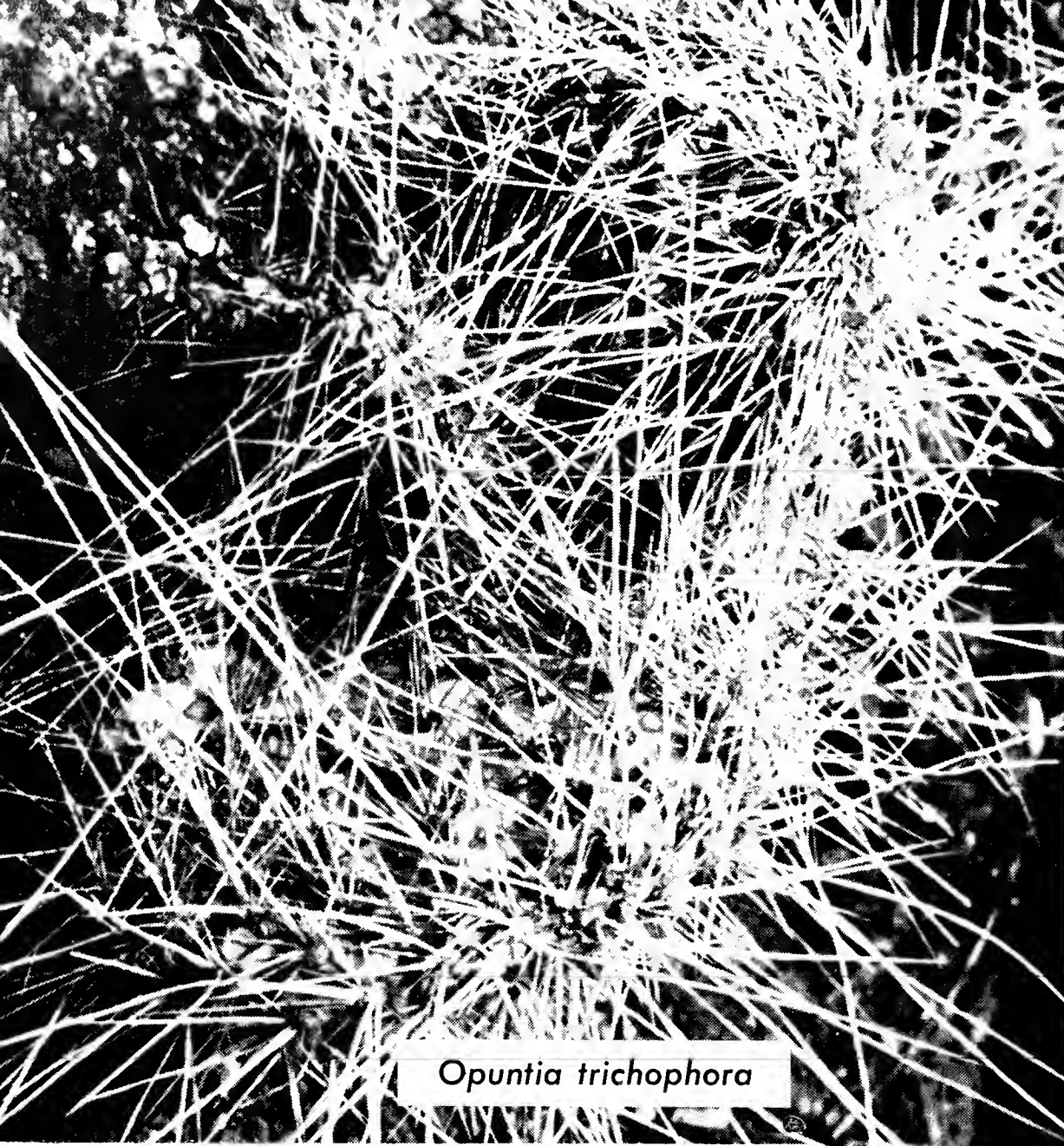
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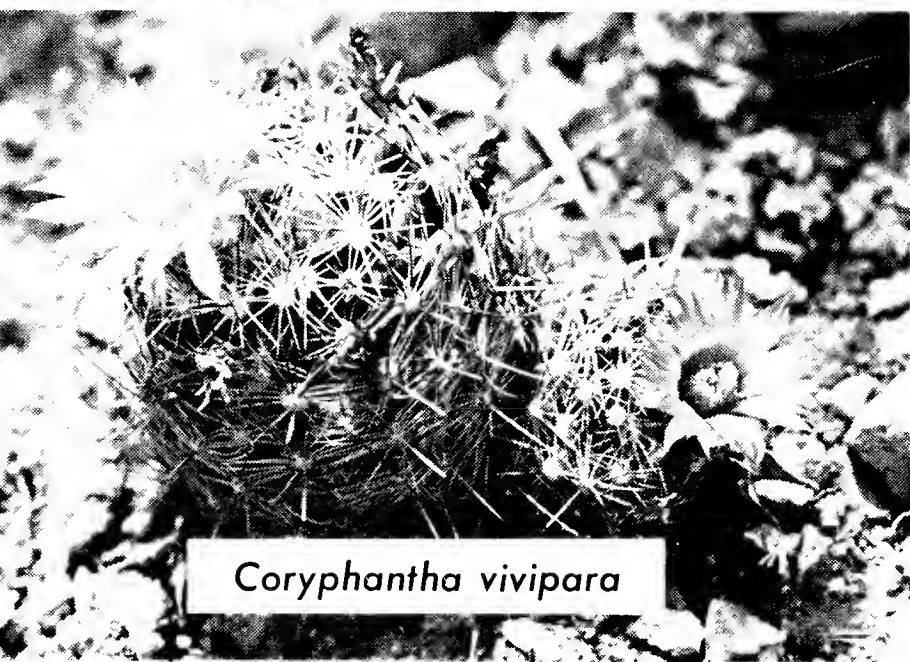
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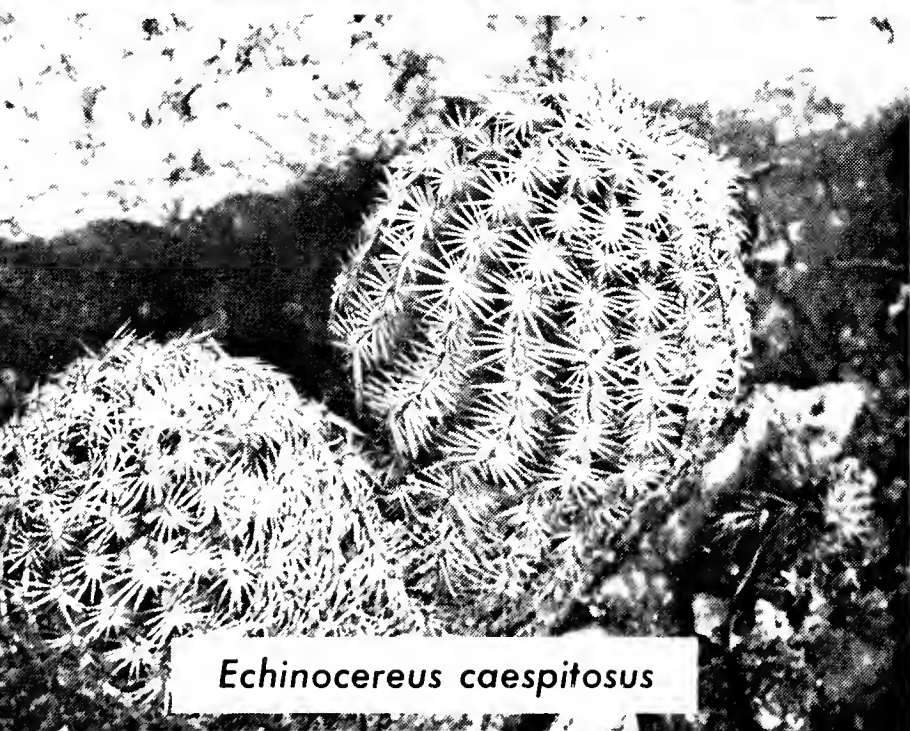
Opuntia trichophora



Opuntia



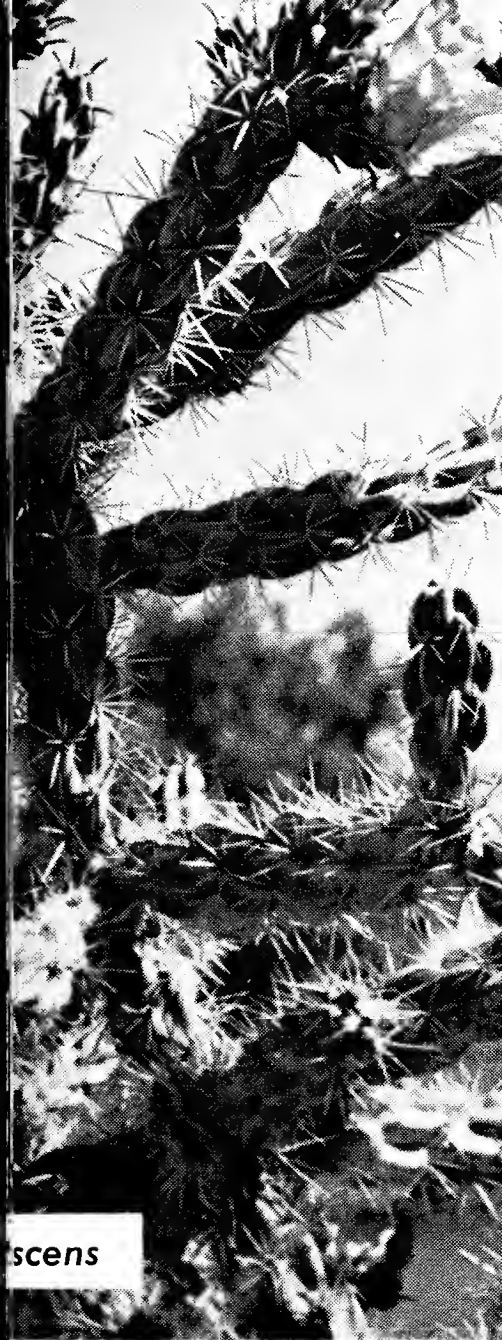
Coryphantha vivipara



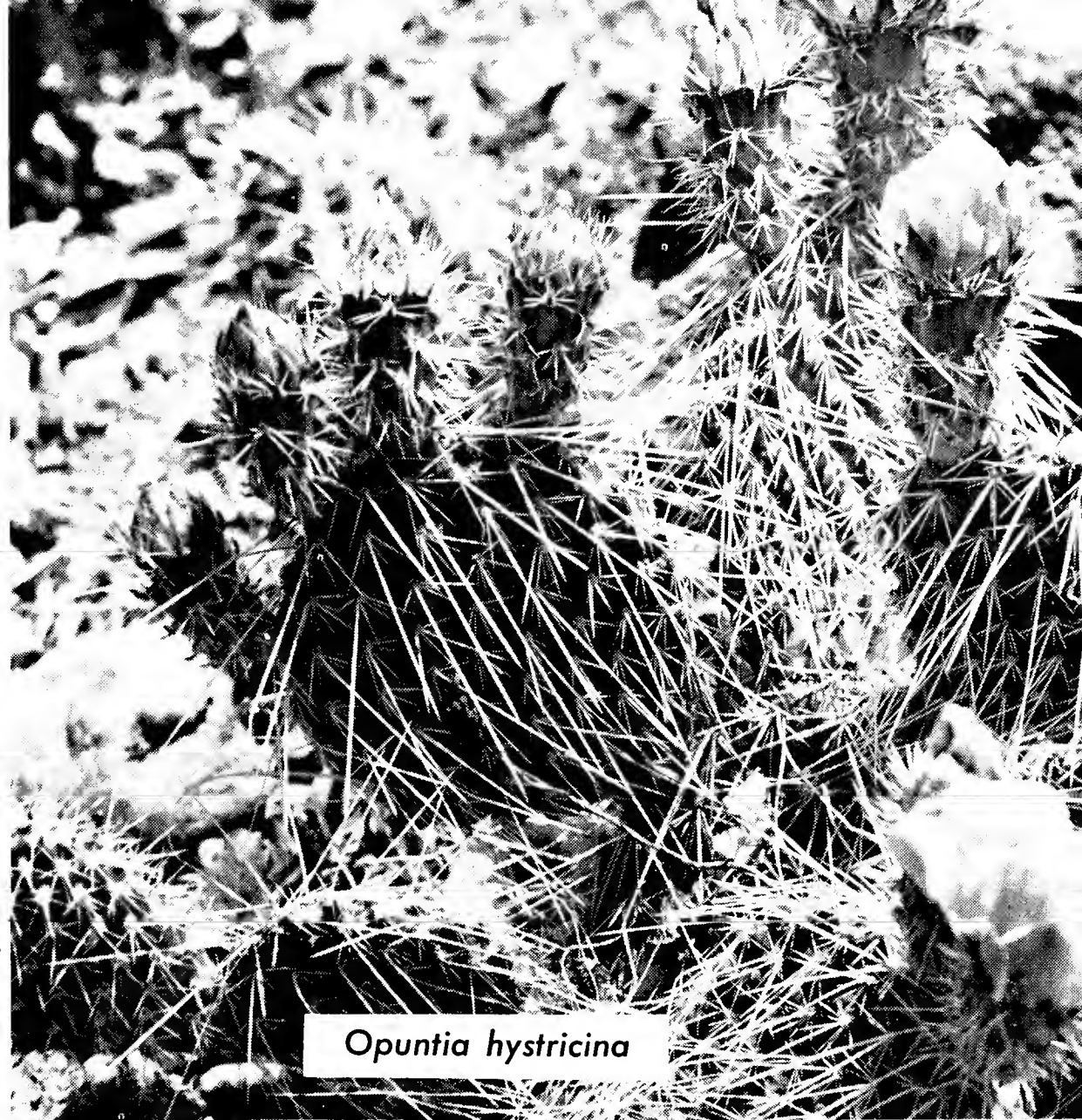
Echinocereus caespitosus



Echinoce



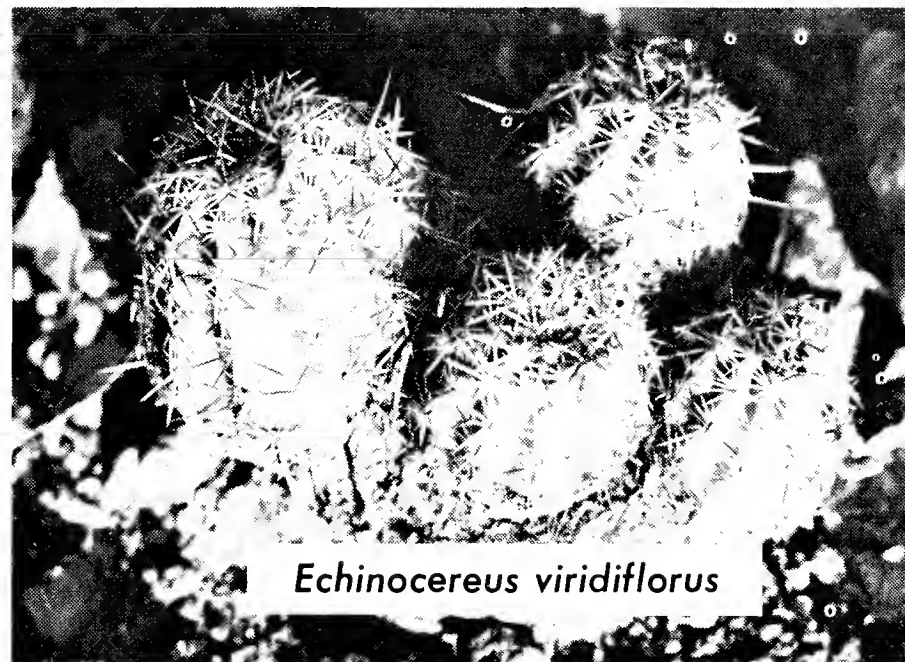
scens



Opuntia hystricina



chidiatus



Echinocereus viridiflorus



Opuntia polyacantha

The Ghost of Mesa Verde

THERE IS A SPECTER haunting cactus land. It wanders mournfully about Mesa Verde Park, Towok, Cortez and Shiprock. The ghost belongs to that elusive member of the Echinocactanae, *Coloradoa mesae verdae*, which was discovered in 1940 by Dr. Charles S. Boissevain of Colorado Springs.

While almost extinct, due to greedy collectors and unscrupulous dealers stripping it from its habitat, this much sought after cactus still grows in remote, inaccessible desert canyons. It can be found, safely tucked out of sight under its covering of bunch grass, on Ute and Navajo Reservation grazing lands where the paleface is looked upon with suspicion, if not actually denied access.

Coloradoa mesae verdae is one of the real "rarities" of the plant world. To reach its habitat is an adventure; to find one is the realization of a dream; to transplant one is an achievement; to keep one growing for more than a year or two is a miracle. Yet, they are found in a large number of gardens. A collector in Albuquerque has a dozen or more flourishing plants. At one time a dealer in Anthony, Texas-New Mexico, was able to supply plants and seeds but where he obtained them was a top secret. Several Denver collectors have specimens and probably other collectors have been equally successful. But, *C. mesae verdae* re-

mains an elusive and tantalizing ghost for the majority of cactologists.

Difficult to find, difficult to transplant, difficult to grow from seed, *Coloradoa mesae verdae* still intrigues both amateurs and experts as a tantalizing will-o'-the-wisp beckoning just over the next hill; enticing around the next jog in the dry, wind-eroded canyon; luring one on another few yards across the desert waste — to frustration.

Coloradoa mesae verdae's elusiveness and the challenge to the collector is probably its only recommendation to the discerning cacticulturalist. One of the most drought resistant cacti known, it survives months of dry, subzero cold and months of excessive heat and dry, hot winds. *Coloradoa mesae verdae* puts out an inconspicuous, vaguely fragrant flower for a few hours each day, for several days, in early May. The ovary soon ripens and forms a hard fruit with remnants of flower clinging to the top. Following this short period of bloom, *C. mesae verdae* withdraws into its hiding place for the remainder of the year.

Coloradoa is particularly susceptible to stem rot which causes it to become soft and fill with an orange colored slimy ooze. It is also attacked by a larva which lives inside the plant and which is not noticeable until the entire stem becomes a hollow shell.

The habitat of this small, globular,

pale green member of the Echinocactanae is the Four Corners country of Colorado, New Mexico, Utah and Arizona. It has 13 to 17 spirally twisted ribs; oblong, slightly wooly areoles with eight to ten appressed spines, three superior and two inferior on each side with, rarely, one hooked central spine. Flowers have inner perianth segments that are yellowish-brown to greenish-yellow and outer segments that are dark brown. Stamens are white and have yellow pollen.—EDGAR SHERMAN

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Due to the fact that the First Avenue Flowers is out of business, Hardesty Ross sent their flowers in November.

BOOKS ON CACTI

A large number of authoritative works on cacti, as well as a number of portfolios illustrating cacti and other succulent plants by artists and photographers, may be found in the library at Botanic Gardens House.


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Membership blank on page 66

TWO CHARMING DEBUTANTES

On some sunny afternoon in the latter part of June the traveler will find the eastern plains dotted with the numerous pale rose and purple flowers of the ubiquitous spiny stars, *Coryphantha vivipara*. It presents quite a sight with its star-like clusters of brown, white or variegated spines and usually 16 spreading laterals with four centrals pointing upward and outward.

Coryphantha vivipara is quite common to the open prairie and the foothills. It is reported hardy as far north as western Canada. It usually grows as a single globose stem but may cluster under favorable conditions. Spiny stars are very undemanding as to soil and thrive on neglect. Apparently they grow just as well on waste land as in the garden where they receive care and attention.

Coryphantha radiosa, which grows in profusion on the western slope, is also found on the eastern plains and commonly all over the state. It is cylindrical and taller than *C. vivipara*, with shorter, more numerous spines in the characteristic star cluster of white, brown and variegated. The fruit is greenish, edible but very tart or sour, giving it the common name of sour cactus.

Both species do well in cactus gardens. In fact, they seem to endeavor



Coryphantha radiosa

to repay their rescuer from the wilds by clustering more freely and putting on a greater profusion of bloom.

The beauty and fragrance of the blossoms is always a thrill to the cactus lover. However, the life of the individual flower is very short, being confined to the early afternoon hours of two or three days; often only one day. Not all buds open at the same time, so the period of bloom may cover some six to eight days — still not enough to satisfy the confirmed “Coryphanthamaniacs”. — ELIZABETH ECKSTEIN

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Victor Tawara

THE LADY AND THE TRAMP

A stay-at-home lovely devoted to her limited habitat in the Grand Junction area, which she never leaves of her own accord, *Opuntia rhodantha* is something of an enigma, as are many human lovelies. She grows in a bewildering array of disguises which are brought about by the differences in sunlight, soil and amounts of moisture.

In a hot, dry environment *Opuntia rhodantha* develops numerous long, brown or variegated brown and white spines. In the shade she is sometimes spineless or has a few scattered white or yellow spines. An abundance of moisture causes the joints to swell until almost cylindrical. In a dry location the joints are flat.

But, the fickleness of this lovely is most aggravating during the blooming season. She may bloom red, for which color she is named, most of the time.

But, for some unknown reason, at times she becomes coquettish and bedecks herself in yellow flowers.

The hitchhiking tramp of Colorado cacti is *Opuntia fragilis*, an unloved vagabond that grows abundantly all over the plains country east of the Continental Divide. It is low and spreading, with vicious brown spines and a few yellow flowers. To the careful observer the yellow flowers, with orange centers, green stigmas and brown stamens, might prove a redeeming feature, but probably not. *Opuntia fragilis* is weedy and inconspicuous until its weakly attached joints grab onto man or animal for a free ride. When finally disengaged from their host they fall to the ground where they root readily and grow rapidly. If it were possible, the Opuntieae would no doubt be very happy to disown this wayward member and cattle and sheep men would be glad to eradicate it.

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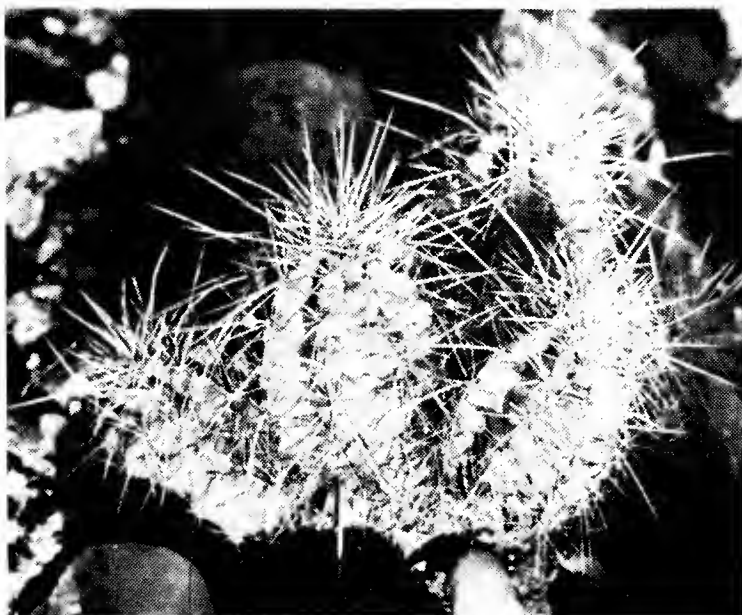
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THE RUGGED INDIVIDUALIST

Echinocereus fendleri is strictly an individualist, preferring to share the sparsely settled, arid region of southwestern Colorado, near the famous Four Corners, with its equally retiring neighbor, *Coloradoa mesae verdae*. Here it nestles close to the ground, seeking to be as obscure as possible and succeeding quite well except in blossom time. Then, what a vision of delicate beauty is unfolded upon the desert! Near the top of the plant, the flowers rise from 3 to 5 inches on an extremely spiny tube and spread their purple sepals, about the same width surrounding green stigmas and purple stamens. Before opening, the buds are pale green, striped with dark green.

When not in bloom, the "sitting cactus", as the Navajos call it, is often



Echinocereus roemerii

mistaken for *Echinocereus triglochidiatus* whose body and spine structure are very similar but whose scarlet blossom can always settle the argument.

Despite its rugged spines, *Echinocereus fendleri* usually does not transplant well, differing in this respect from "the three sisters", *E. triglochidiatus*, *E. coccineus* and *E. roemerii*. Again, like the neighboring *Coloradoa mesae verdae*, this "sitting cactus" likes to sit in its native alkali soil in its own weirdly fascinating homeland. But, it is eminently worth-while to try to make the tempermental beauty happy in your garden.



BULLETIN

Colorado Cactophiles publishes a monthly bulletin, mimeographed, which prints information about cacti and news of other cactus clubs in the United States and overseas, to keep its membership informed of cactus activities.

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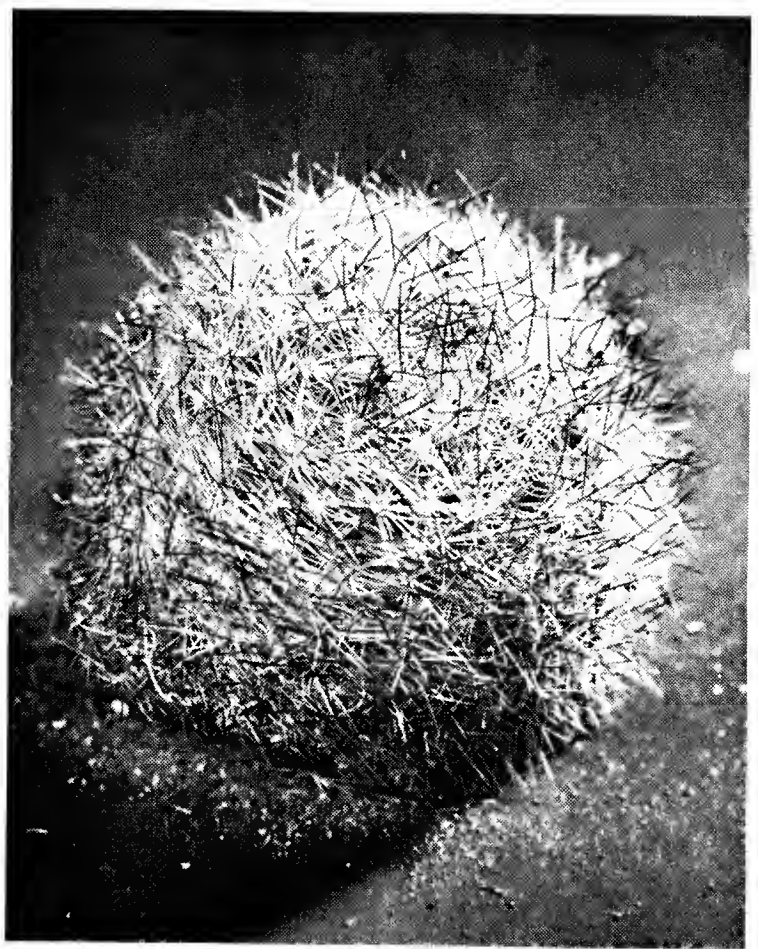
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A Cactus That Moved to the Mountain

WHAT'S IN A NAME? *Pediocactus*, for instance. This name, derived from the Greek *pedion*, means lowland or plains cactus. 'Taint no such thing. The common name, mountain cactus, is much more appropriate, as *Pediocactus* is rarely, if ever, found at altitudes lower than 6,000 feet and is perfectly at home on mountain slopes and passes up to 10,000 feet elevation.

George Engelmann, relying upon a report of the Simpson Expedition in 1876, called this cactus *Echinocactus simpsonii*; M. E. Jones reported it as *Mammillaria simpsonii*; Schumann as *M. purpusii*. As all reports gave the habitat as eastern Colorado and Kansas, Britton and Rose established *Pediocactus* as a monotypic genus and named its representative species *simpsonii*. It has never been found on the eastern plains and its occurrence in Kansas is doubtful. While the name is misleading, it is valid. "A rose by any other name would smell as sweet." Call it *Pediocactus*, mountain cactus, Pikes Peak cactus or . . . something else if you sit on one!

Pediocactus, during its growing season, likes considerable moisture, partial shade and good drainage. In the lower elevations of its habitat it grows near tall grass or low bushes. In the higher altitudes it seeks the protection



Pediocactus simpsonii

of conifers, whose fallen needles provide a porous cushion for its roots. And what roots! They don't go deep but many a 2-inch plant can boast a root spread of 3 feet. Snows come early and stay late in the mountain areas. In the spring, *Pediocactus* pops up through the white blanket and flaunts its pink blossoms in the face of the retreating winter.

Pediocactus simpsonii is from 3 to 6 inches high and 2 to 6 inches in diameter. Tiny seedlings, no larger

than the end of the little finger, are often found nestling among the larger plants. There are two varieties: *P. simpsonii minor* and *P. simpsonii robustior*, a monster rarely found. Both varieties always grow in a well-protected spot with very fertile soil. All are globular, usually with single stems. Pink to rose blossoms, about 1 inch across, arise from a nest of soft white wool and have a honey-like fragrance well worth the wear and tear on knees and back to catch a whiff. Blooms may last up to five days but are only open in the full sun for two or three hours around the middle of the day. The variations are mostly a matter of the spine arrangement. The mountain cactus is so completely covered with fine spines that it looks like a brown ball. The spines of the Pikes Peak (*minor*) variety do not overlap and the lovely green of the numerous tubercles show through, producing a delicate lacy effect. The variety *robustior* follows the same pattern as *P. simpsonii* and is probably just an overgrown mountain cactus, rather than an actual variety.

Pediocactus simpsonii is an excellent cactus for the outdoors garden in almost any location. It thrives on a sunny slope in a partially shaded spot. It needs more water than most Colorado natives and prefers a well-drained location but has been known to grow in swampy ground. It is rarely harmed by either rodent marauders or insect pests. It has been known to flower the last week in March but mid-April to May is the usual flowering season.

—G. J. TOMLIN

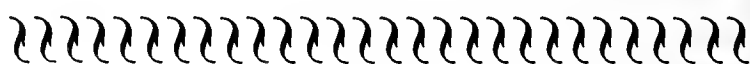
AFFILIATION

Colorado Cactophiles is affiliated with The Cactus and Succulent Society of America and Denver Botanic Gardens.

BEAUTIFUL BUT USELESS

Because its fruit is deceptive, being hard, dry and inedible, starvation cactus was the name given by the Indians to *Opuntia polyacantha*. This many-spined, flat-jointed native of Colorado resembles the edible prickly pear cactus and grows most abundantly on the eastern plains.

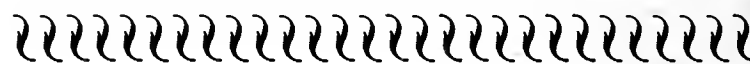
The grayish-green joints of *Opuntia polyacantha* are large, about 3 by 4 inches. Its bristles and spines are many and exceedingly painful when encountered by man and it spreads widely and rapidly. While uninteresting most of the year, during the blooming season it is colorfully gorgeous in its dress of pink, orange or red-tinged yellow blossoms.



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A TRIANGLE FOR CONTRAST

Naturally an inhabitant of the western part of the state, from which it has never migrated of its own initiative, *Opuntia rutila* is known as the triangle cactus, because of its triangular stems or pads. It is distinguished by its comparatively short, stiff, reddish-brown spines and an abundance of brilliant rose-red blossoms. The flowers appear at the tip of each stem and are usually as large as the stem itself. It is grown in cactus gardens the world over. Collectors find its ovoid and triangular stems a pleasing contrast to the conventionally shaped pads of the other flat-stemmed cacti.

THE CONFUSED "KAH-BES-ZI"



Sclerocactus whipplei

WHILE CLASSED with the Echinocactanae, *Sclerocactus whipplei* has never been able to make up its mind whether to belong to that sub-tribe or to the Echinocereanae. So it sets on the fence, so to speak, bearing its gorgeous purple blossoms from the top of young areoles, as does the Echinocactanae, which it is, or from lateral areoles, as an Echinocereanae, which it isn't, with equal frequency and complete indifference.

Somewhat confusing to the more scientific minded, this split personality detracts nothing from the interest of this southwestern Colorado beauty. It belongs to that somewhat exclusive group including *Coloradoa mesae verdae*, *Echinocereus fendleri*, *E. cocci-neus*, *Opuntia rhodantha* and *O. hystri-cina*, which have a common habitat and are recluses found only in the Four Corners country where Colorado, Utah, New Mexico and Arizona get together in chummy fashion.

Called "kah-bes-zi" by the Navajos of the region, this species is also known as the braided arrow or devil's claw. (The latter two names were suggested by the spine structure.) It is globular to cylindrical, 4 to 8 inches tall; 3 to 6 inches in diameter with 13 usually spiraled ribs. There are one to four

central spines, 1 to 1½ inches long, one of which, usually the lower, is hooked; 7 to 15 lateral spines, white, gray-brown and black. The younger spine growth of the variety *spinosior*, which is larger and has more numerous spiraled ribs, is sometimes a distinct red color.

With its variegated spines and showy purple flowers, up to 1½ inches across, *Sclerocactus whipplei* and its variety, *spinosior*, look so much like a tropical cactus that they might be thought of as too delicate to grow outdoors in Colorado. But that appearance is deceiving. They transplant well, are true sun worshipers, like only a little water during the growing season and when dormant will survive temperatures down to 20 degrees below zero.

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RED OWL

A Desert in the Living Room

A DESERT in the living room? Impossible! Not at all, if you grow your cacti from seed. From the very beginning these small seedlings assume their characteristic, interesting colors and shapes. A miniature desert can be created in a small space anywhere in your home. And, if your enthusiasm carries you away, don't worry. Most of the native Colorado varieties may be moved to an outdoor location, if you should run out of room indoors. These native cacti, when planted outdoors, make a hardy and attractive addition to your yard planting.

For those who love the outdoors of Colorado and the great variety of native cacti, this hobby presents possibilities for raising some of the rare types which are difficult to find in the field. These natives are the easiest of all cacti to raise from seed and are most successful when natural growing conditions are duplicated as nearly as possible.

The best time to plant seed is in the late spring. An excellent soil mixture for this purpose consists of one part garden loam, one part sand and one part coarse-grained vermiculite. In nature, the tiny seedlings are usually found protected from full sun by larger plants and you will find that your seedlings will do better if provided a similar shade. Although cacti grow naturally in dry areas, seedlings need to be well-drained and have frequent and regular waterings.

The first year, the tiny cacti will

make good growth and should be left undisturbed in the community pot until the following spring. At that time they may be potted separately or planted directly outdoors. Almost any of the native cacti can be wintered over if placed in a raised bed of sandy soil which receives sufficient winter sun. Although some of the small cacti will be lost the first winter, enough will survive to make the project worth-while.

When growing the more exotic types of cacti, such as those from South America and Africa, more care must be taken. These plants do well in the same soil mixture but results will be much improved if this mixture is first sterilized. This may be done in your kitchen oven. Cover the mixture with water to eliminate much of the odor. Heat the mixture at about 250 degrees Fahrenheit for two hours or more, depending on the amount of soil to be sterilized. If the water is steaming you have accomplished your purpose.

Drain off the excess water and dry your soil a bit so it is aerated. While native cacti seeds are of fair size, many of the other varieties are really dust-like. A small, folded piece of white paper can be used to spread the seeds evenly over the surface of the soil. Do not cover the seed. Place a plastic sheet over the pot and expose it to light and warmth.

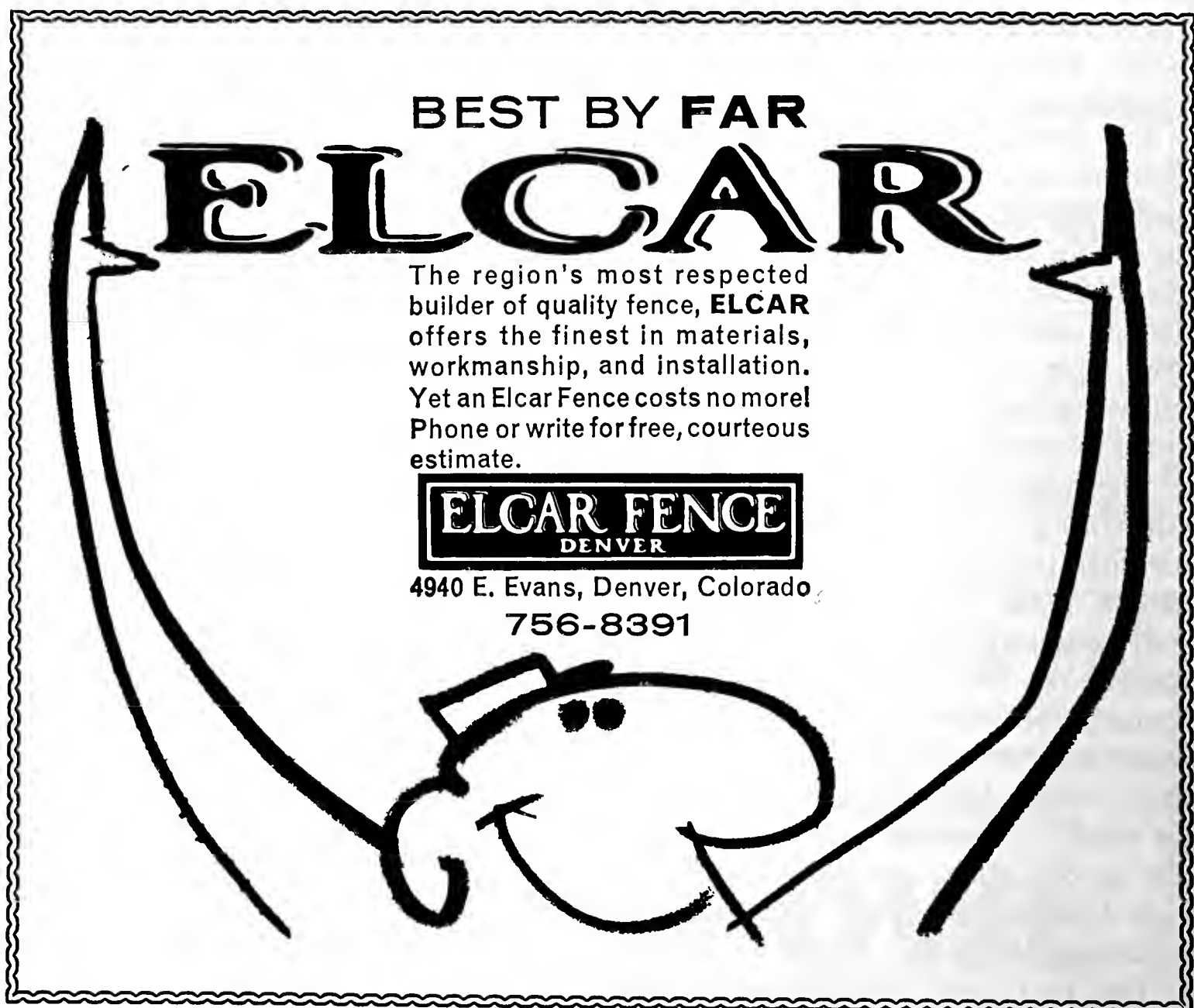
Greatest success in germination is attained by using a controlled system

of heat and light. One 40-watt Grow-Lux tube will provide the light to germinate a large number of seed. These are available in most garden stores and can be used in most standard fluorescent fixtures (not a rapid-start type). They give off very little heat and give a balanced light made up of the blue and red rays needed for plant growth. Many seedlings may be raised by placing a double row of 3-inch pots under the 48-inch length of one 40-watt tube.

Place the pots 3 inches from the tube as soon as planting is completed. Keep the day and night temperature at about 70 degrees Fahrenheit. The plastic sheet will keep the humidity high, so it is a good idea to give the seeds a good airing for a few minutes once a day. Do not over water but

only as the soil begins to look and feel dry. Even cacti, when this small, need regular watering.

Although many cactus growers have had some difficulty in raising these plants from seed, success in the venture is practically assured by using the method described. It is fascinating to watch these small plants grow and develop. You will find your patience developed, too, as it takes a long time for a cactus plant to mature to a flowering size. If you persist you can have the most beautiful cacti in the world right in your own home for a very small investment. If you choose to grow some of the rare native cacti, you will also be helping to preserve some species which are now becoming almost extinct in our state. — PAUL HOLLAND




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THE DWINDLING DWARF

The dwarf cactus, *Opuntia schweriniana*, at one time grew abundantly in its habitat on the west slopes of the higher foothills. This small, very elegant but painfully stinging species has obovate joints only 1½ to 2 inches long. While generously endowed with areoles filled with vicious brown glochids, which is its main attraction, it has comparatively few spines, which are white in young plants but shade through gray to black in older, all slanting downward. Flowers are a greenish-yellow to pink.

The brown glochids contrasting with the shiny green stems makes *Opuntia schweriniana* so attractive it has found its way into many gardens throughout the world—so many in fact, that this species in its natural habitat may well become “the little man who isn’t there”, due to unscrupulous dealers and greedy collectors.

NATIVES THRIVE UNDER GLASS

Colorado cacti are used largely in outdoor beds in many regions where conditions of their habitat may be approximated. All species, however, may be grown successfully with the protection of a glasshouse or on window sills. They beautify the collections of many cactus enthusiasts in the New England states, northern Canadian provinces, England, France, Germany, New Zealand, Australia and Asia. Plants sent by Colorado Cactophiles are thriving in Northern Rhodesia, Jardin Exotique in Monaco, Tasmania and Japan.



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In Memoriam

ROBERT E. MORE

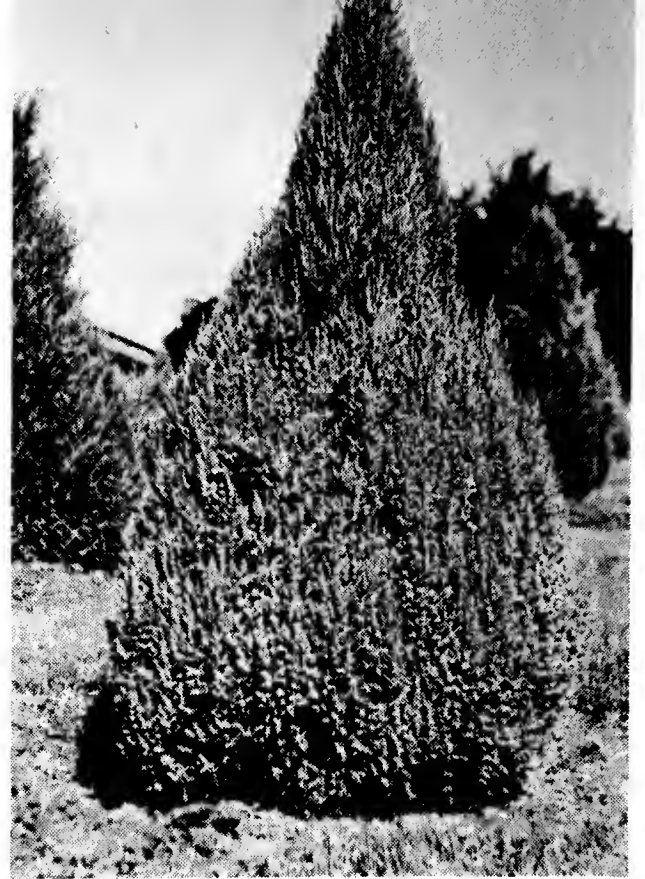
RHODA N. ROBERTS

(Editor's Note: Not only Mr. More but also his colleagues in the law firm with which he was associated were actively interested in botany and horticulture. The perfection of the color portraiture of flowers by both Harold D. Roberts and his wife and the gift of the Keegan Lilac Collection to Denver Botanic Gardens are examples of the intense interest these men had in the plant sciences.)

ROBERT E. MORE was born in Denver, educated in the public schools here and attended college at Dartmouth and at Harvard Law School. He was associated for many years with the law firm of Dines, Dines and Holmes, later Holmes, Roberts, More and Owen.

His family owned a summer cottage at Buffalo Park, Colorado, and from his early boyhood he roamed that area, climbed its mountains, fished its streams. For the remainder of his life it was his "Land of Heart's Desire." He always loved the outdoors but his interest in botany developed fairly late. I can remember when Bob didn't know a narrow-leaf cottonwood from a willow. It was characteristic of him that when an interest was aroused, he pursued with gusto. His real hobby was research on evergreens hardy to this region and his monograph entitled *Colorado Evergreens* was a product of his intensive studies. The book was first published by the Denver Museum of Natural History in 1943, and a revised edition was published in 1947. To quote Dr. Alfred M. Bailey, "It is a unique volume that is informative, interesting and beautiful."

Bob increased his acreage in Buffalo Park and experimented with evergreens



Junipers in the More Pinetum

of many types to find new varieties that might prove hardy in the Colorado climate. At the height of these tests there were 200 varieties growing in his Glenmore Arboretum. It is most unfortunate that the heavy expense and the More's move to California ended that fine project.

The More Pinetum, the evergreens all around the Museum Building in City Park and particularly the plantation south of the building, was presented to the City and County of Denver by Mr. More in 1954.

He was on the Executive Board of the Museum of Natural History for many years, a member of the Botany Club and one of the most active members in organizing the Colorado Forestry and Horticulture Association, former publisher of *The Green Thumb*. He was a prime mover in organizing and developing Horticulture House on Bannock (where the University of Denver Law School now stands). He was one of the founders of the Denver Botanic Gardens, Incorporated, and a charter member of its Board of Trustees until he resigned when he moved to California. For his service to this community and for his generous gifts, his memory will be a lasting one.

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1964 Colorado Garden and Home Show *Feature Garden*

GEORGE KELLY

(Editor's Note: Mr. George Kelly, designer for the 1964 Colorado Garden and Home Show, describes the garden designs which will be featured at the show.)

THE GARDENS which will be featured at the 1964 Colorado Garden and Home Show were designed to demonstrate the four main influences that govern the design of gardens in Colorado.

The first of these influences is that of the English or northern European. Grass, ample moisture, abundant shade and bright flowers are essential components in this type of design. These gardens were often formal and usually were enclosed by walls, fences or hedges. Our adaptation of the English garden reached us from the east coast of the United States. The gardens of Williamsburg, Virginia are considered good examples of this type of design.

As many parts of our country are not rainy we gradually began to adopt many of those features that had been developed in Spain and southern Europe. This form of design features platforms, walls and patios with water in some form such as fountains, pools and rills. Some of the Spanish garden ideas fit into the climate of California and were adapted for use there.

These two influences, the English from the east coast and the Spanish from the west coast, gradually filtered

through the intervening states and merged in Colorado.

Then, in the last few years, we have learned that much of the garden design used in Japan for so many hundreds of years could be adapted to fit very well in our Colorado climate. The main features of the Japanese gardens that are useful here are: (1) The use of animate or inanimate ground covers. (Myrtle, sedum, gravel and stone areas and water surfaces are examples of this type of ground covers.) (2) The use of character rocks as specimens, carefully selected and placed to be effective. (3) The use of shaped plants to give desired effects, such as low mounds, tall, slim exclamation points, espallier and the so-called bonsai or character or timberline (contorted) trees.

All of these foreign influences must be modified and adapted to fit our climate of bright sunshine, wonderful distant views, low humidity and temperamental weather.

The fourth influence is, of course, our own mountains.

Each of the three foreign influences will be demonstrated at the Garden and Home Show in four ways: (1) A

typical garden in the old traditional manner. (2) A garden using this influence designed for the patio in the rear of the house. (3) A small design to dress up the entrance or doorway. (4) An appropriate feature for the distant corner of the garden, which will give interest to a garden even though there is no mountain view.

In addition to the above, there are several gardens using a combination of all these influences and especially adapted to our conditions. (1) A good rock garden is always appropriate in the Rocky Mountain area. This can be a pleasing blending of all four of the influences. A good rock garden should look as though it has grown naturally and should be of interest every month of the year. (2) A garden designed for that hot, dry, south side of the house. This should be made up of plants that love the heat and inanimate features that need little water.

It can be so designed that it requires little care. (3) A garden for that shady, north side of the house. Actually, this seemingly difficult place will welcome some of the very nicest plants, which could not survive in the hot, sunny places. The broadleaf evergreens can be featured here. (4) To many people a garden means roses, so a rose garden should be featured using the different types of roses in appropriate design.

We hope that you will see some features demonstrated at the Garden and Home Show that can be adapted to fit your requirements. Talk to the people who have set up these gardens and learn more about the plants used, the methods of construction and the cost. The purpose of the Garden and Home Show is to give you ideas on how you can make your own grounds more comfortable, more livable and more beautiful.



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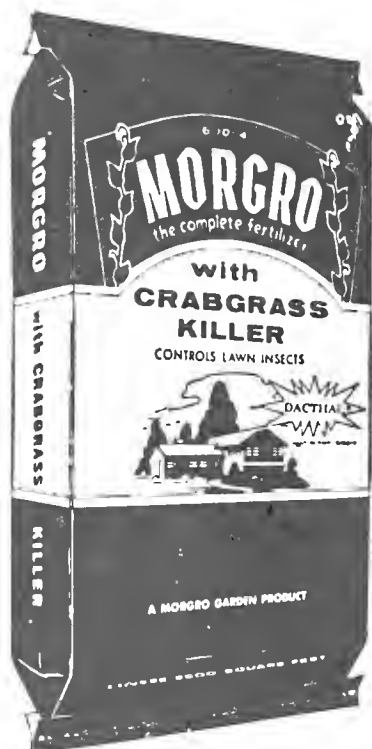
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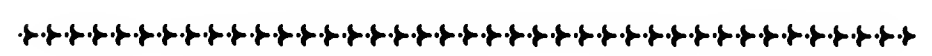
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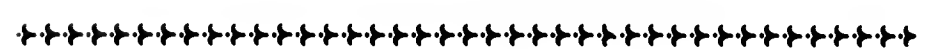
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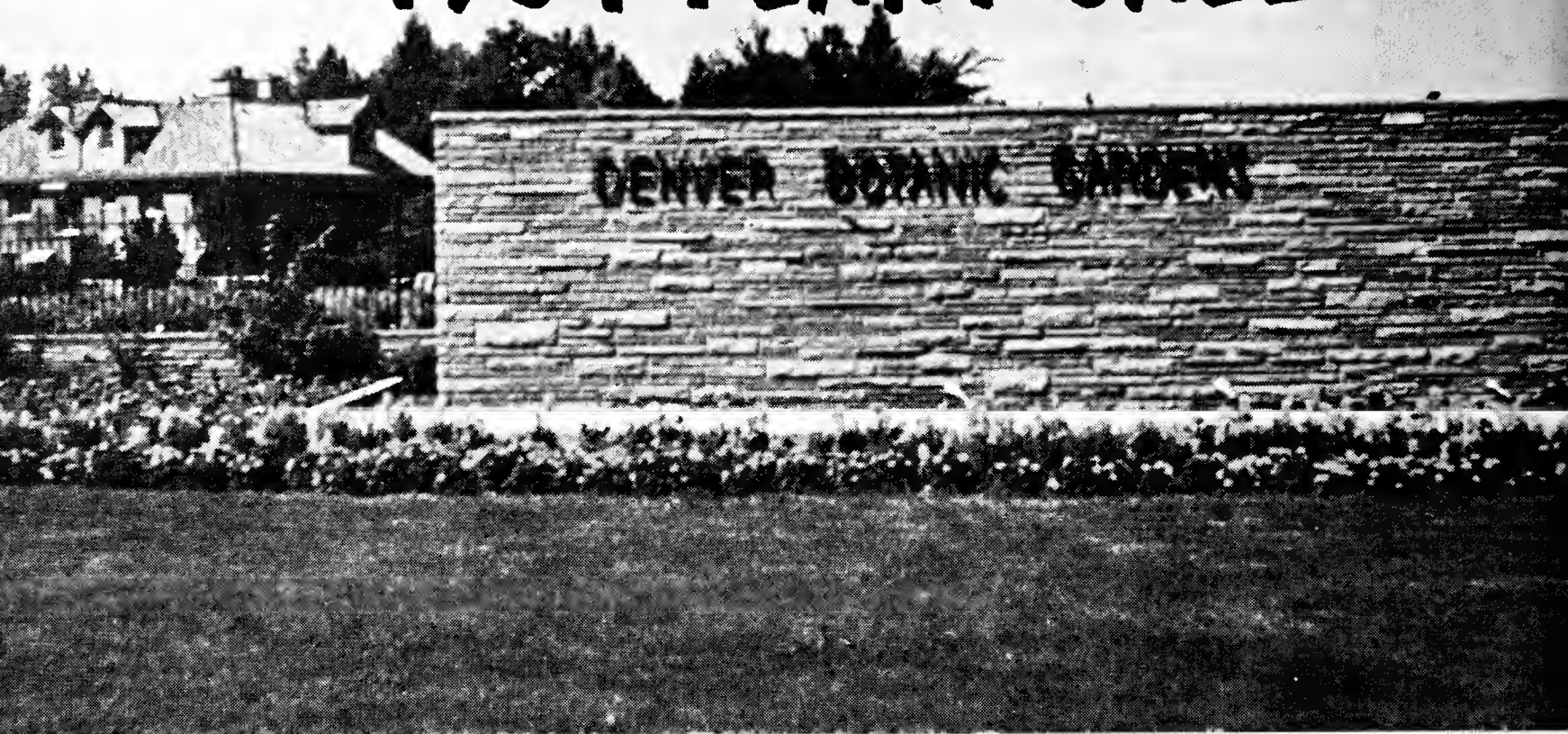


THE COVER

Illustration by
Mrs. James P. Steele, Jr.



1964 PLANT SALE



MRS. THEODORE WASHBURNE

SPRING INTO THE planting season at this year's annual Denver Botanic Gardens Plant Sale. By popular request we will again oblige both eager gardeners and gift-seekers by holding the Plant Sale on Mothers' Day week-end, May 9th and 10th.

How can you miss the location — the Botanic Gardens House at 909 York Street? The front of the House will be gaily festooned with banners and the lawn will boast white and green umbrella tables. To the north of the House you will find a wide variety of hardy annuals, perennials and herbs, not to mention nursery stock for your unfinished landscaping job.

Do you have a problem? Don't we all! This year's sale will offer experts in many fields: see how to properly plant your gladioli; find out which irises to plant; talk to the rose expert himself; discuss the value of various dahlias; learn to distinguish one cactus from another; and can you identify our native birds? Yes, this year's sale will offer you an opportunity to question and end your quest for the perfect plants.

Luncheon too will be served. Light refreshments: sandwiches, soda pop and ice cream can be enjoyed at the umbrella tables while you sit and ponder what to buy next. Of course, the children are welcome too. A constant supply of peanut butter and jelly sandwiches will be turned out in the kitchen to keep them well-fed while they browse at the booth, especially for children, with bargains at "25¢ and under". Watch their curiosity grow along with their own special plant.

And don't miss that gay, green tent. It's this year's bargain center of vases, pots, books — odds and ends. You name it but we call it the Bargain Booth.

Don't leave yet. Garden accessories of every style are just around the corner. Metal-mesh patio furniture, concrete planters and benches and, of course, bird baths and bird houses. Gardening equipment will also be available so you can get right out and dig among your plants.

That's right, the time for planting is perfect, the date is perfect. That last frost can't possibly nip your annuals. The location is perfect, right in the center of town, easy access via 6th or 8th Avenues or York and Josephine Streets. The day is perfect, fair skies and balmy breezes. Don't forget mother, let her help the rest of the family choose the choice plants.

See you in May at the Plant Sale.

HANGING BASKETS

Encouraged by your enthusiastic response to the few hanging baskets sold last year, the committee is offering baskets in color combinations predominately lavender, pink or white. Hanging baskets for shaded areas will be available by special order.

Denver Botanic Gardens
Annual Plant Sale
May 9 and 10

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TULIPS

BEVERLY M. PINCOSKI and JOSEPH W. OPPE

IN THE FALL of 1962 Denver Botanic Gardens, in cooperation with the Netherlands Flower-Bulb Institute, Inc., began a three-year test of tulip varieties. The prime purpose for this trial was to discover which of the tulip varieties were best suited for planting in the Denver area.

The test planting, located at the Botanic Gardens' York Street Unit, includes 7,750 plants representing 155 species and varieties. Many are recent introductions but old types were included for comparison. Twenty-five bulbs of each of the 155 types were planted at a depth of 8 inches and a similar number were planted at a depth of 12 inches. Except for this variation in planting depth all other cultural practices, such as watering and cultivating, were approximately the same for all types.

The following report was based on the results of only one growing season and consequently cannot be considered conclusive. It does, however, give some indication of the correct cultural practices and best varieties for use here in Denver.

Tulipa, a genus of the lily family (Liliaceae), has 150 or more species which are native from the Mediterranean region across Asia to Japan. Represented within this genus are some of the most spectacular of the spring-blooming herbaceous perennials.

Garden tulips have been so thoroughly hybridized that their ancestral species are almost impossible to determine. This does not mean that all cultivated tulips are hybrids. On the contrary, many species of *Tulipa*, such as *T. kaufmanniana* and *T. eichleri*, are so attractive that they warrant a place in the gardens of the world.

Tulips can be considered as belonging to one of two groups: (1) "botanical" or "species tulips" and (2) "garden tulips".



Tulips growing in the York Street Unit.

SPECIES TULIPS

For convenience, all true species are placed in the "species tulip" group. This group contains a number of at-

tractive, widely differing subjects. The following members of this group appeared to be the most effective of those included in the test:

Tulipa eichleri — Bloom time — mid-April; height — 5 inches; color — scarlet-red.

Tulipa fosteriana 'Cantata' — Bloom time — mid-April; height — 5 to 8 inches; color — vermilion red; foliage — shiny green.

Tulipa fosteriana 'Princeps' — Bloom time — mid-April; height — 5 to 8 inches; color — scarlet-red.

Tulipa greigii 'Oriental Beauty' — Bloom time — late April; height — 5 to 8 inches; color — red, base brown; foliage — mottled.

Tulipa greigii 'Red Riding Hood' — Bloom time — late April; height — 5 to 8 inches; color — scarlet-red, base black; foliage — mottled.

Tulipa kaufmanniana — Bloom time — early April; height 4 to 6 inches; color — yellowish-white, outside tinted carmine-red.

Tulipa kaufmanniana 'Johann Strauss' — Bloom time — early April; height — 4 to 6 inches; color — white, exterior flushed with red; foliage — green striped with brown.

Tulipa kaufmanniana 'Shakespeare' — Bloom time — early April; height 4 to 6 inches; color — blend of salmon, apricot and orange, interior shaded red.

GARDEN TULIPS

A number of different categories are represented within the general classification of "garden tulips". Representatives of 12 of these categories were included in the tests, and of these the following varieties proved most satisfactory:

Early Single Tulips — Bloom time — late April; approximate height 8 to 10 inches. Extremely useful for bedding purposes or borders. Large flowered but with shorter stems than the later types.

Recommended varieties

'Cassini' — dark brownish-red.

'Prins (Prince) Carnaval' — artistic combination of red and yellow.

Early Double Tulips — Bloom time — late April; approximate height 7 to 10 inches. Fairly robust with large flowers that last longer than single tulips. Useful as bedding plants.

Recommended varieties

'Carlton' — deep turkey-red.



'Oxford' tulip, Darwin Hybrid

Mendel Tulips — Bloom time — late April; approximate height 10 to 13 inches. Excellent habit with flowers in colors ranging from white to red. Valuable for garden use.

Recommended varieties

'Apricot Beauty' — salmon-rose pastel, overlaid with touch of light apricot-rose.

'Beauty of Volendam' — flamed violet-red on white ground.

Triumph Tulips — Bloom time — late April; approximate height 11 to 16 inches. Strong, tall stems and vigorous habit. Valuable in borders or for general garden use. Self-colors, bi-colors, edges, flushes, stripes and margins stress the beauty of this class.

Recommended varieties

'Bingham' — golden-yellow.

'Blizzard' — pure white.

'Denbola' — red, edged yellow.

'Emmy Peeck' — deep lilac-rose.

'Rhineland' — carmine-red, edged yellow.

Darwin Tulips — Bloom time — late April to early May; approximate height 12 to 20 inches. Long, upright stems, brilliant colors. For use in borders, gardens and for cutting.

Recommended varieties

'Anjou' — canary-yellow, edged butterscup-yellow.

- 'Aristocrat' — soft purplish-violet, edged in pale violet to white.
- 'Dorrie Overall' — lilac-blue, edged mauve.
- 'Elizabeth Arden' — rose-pink.
- 'Glacier' — ivory-white.
- 'Most Miles' — currant-red, base yellow.
- 'Pink Supreme' — pink.
- 'Sweet Harmony' — lemon-yellow, edged ivory-white.

Darwin Hybrids — Bloom time — mid to late April; approximate height 10 to 16 inches. Large flowers in a multitude of colors. Resulted from crossing Darwin tulips x *Tulipa fosteriana*.

Recommended varieties

- 'Apeldoorn' — cherry-red, base yellow, inside red with black base.
- 'General Eisenhower' — signal-red, base white edged blue.
- 'Gudoshnik' — creamy peach-yellow, streaked and dusted rosy-red on outer petals, interior yellow with bluish-black base.
- 'Lefebvre's Favorite' — scarlet-red, base golden-yellow.
- 'Oxford' — orange-scarlet, base yellow.
- 'Pres. Kennedy' — golden-yellow, overlaid with flush of soft pink.

Double Late Tulips — Bloom time — late April to early May; approximate height 7 to 12 inches. Flowers, in colors from white to red, borne on sturdy stems.

Recommended varieties

- 'Gerbrand Kieft' — carmine-red, edged white.
- 'Mystaris' — carmine-red.

Lily-Flowering Tulips — Bloom time — early May; approximate height 10 to 16 inches. Flowers with reflexed and pointed petals borne on tall stems. Useful for cutting and arranging. Plant in large groups for best effect.

Recommended varieties

- 'Dyanito' — bright red.
- 'West Point' — primrose-yellow.

Breeder Tulips — Bloom time — early May; approximate height 11 to 14 inches. Flowers are large and range from purple to copper in color.

Recommended varieties

- 'Dillenburg' — terra-cotta orange.

Single Late (Cottage) Tulips — Bloom time — early to mid-May; approximate height 12 to 22 inches. Received the name "Cottage Tulips" because they were found

growing in old cottage gardens of Great Britain and France. Flowers with long, oval shaped perianth segments, in a good range of color from white to brilliant red.

Recommended varieties

- 'Halcro' — strawberry-red, base yellow edged green.
- 'Ivory Glory' — ivory-white.
- 'Magier' — white, edged blue-violet.
- 'Maureen' — marble-white.
- 'Princess Margaret Rose' — yellow, edged scarlet-red.



'Blue Parrot' tulip

Parrot Tulips — Bloom time — late April to early May; approximate height 7 to 12 inches. Flowers in colors from white to red, borne on sturdy stems.

Recommended varieties

- 'Black Parrot' — maroon-black.
- 'Blue Parrot' — bluish-heliotrope.
- 'Red Parrot' — raspberry-red.
- 'White Parrot' — white.

CULTURE

In Denver, tulip bulbs can be planted from the time they are available in the fall until the ground freezes. Early planting is preferred. Select a well-drained site which is exposed to full sun or only partial shade.

Excavate the planting bed to a depth of 12 inches. If the soil at that depth is hard clay dig out another 3 or 4 inches and replace to the 12-inch depth with good top soil. Set the bulbs on the bottom of the bed, spacing them 6 to 8 inches apart, depending upon the size of the plant. Small botanical ones can be set closer than the large Darwins and Darwin hybrids. Fill the bed with top soil.

Manure is not used in tulip beds by many tulip growers because it encourages disease. Peat and thoroughly composted leaf mold may be used if necessary to loosen heavy soil. After planting, water thoroughly to soak the bed to its full depth.

The 12-inch planting depth is somewhat deeper than usually recommended, however, there are good rea-

sons for this practice. Shoots from deeply-set bulbs emerge later than those from shallow planting and therefore tend to escape our damaging late freezes. Deep planting also protects bulbs from damage by cultivation. The most important advantage is that bulbs set a foot deep do not multiply as rapidly as those set 4 to 6 inches deep. Therefore, deeply-planted beds do not have to be replanted as often as those shallowly-planted.

Flower stalks should be cut off immediately after the flowers fade in order to prevent seed formation. However, the leaves should be left intact until they turn yellow and start to die back. The active green foliage is needed to manufacture food which is stored in the bulb for next year's growth and flowering.

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HAPPY MEMORIES of how things grew back where Denver newcomers came from will have to be thought of as just happy memories for the transplanted gardener who wants to make a garden grow here in Denver.

The aridity of atmosphere and alkalinity of soil are key elements in establishing the character of Colorado gardening. The mountain areas and altitudes have a different ecology than the plains. It is important to realize this and adjust plant material accordingly.

Growing conditions are different, but how? How are things different: How do you find out?

Start out with the Denver Botanic Gardens, an excellent place, whose staff will assist in answering horticultural questions. The Helen Fowler Library there is well stocked with helpful volumes.

Visiting the excellent nurseries where plants are labeled is one way you can identify the many varieties available. It will be important to see these different plants at maturity too so you can get an idea of scale. This can be done by observing the plant material in the older neighborhoods of Denver and by making trips to our many city parks and parkways.

Each year the Botanic Gardens arranges tours through private gardens

where many sorts of landscape design, ranging from small to large, can be observed. These "Look and Learn" tours are a delight to the newcomer, for they show in the easiest way what can be done.

The third floor of the Denver Museum of Natural History is another source of gardening information. As you view the artful renditions of Colorado in its different ecological aspects, with its flora and fauna authentically displayed, you can secure a knowledge of native plants which grow well and identify them from the labels.

There is a pinetum on the south side of the Natural History Museum with many varieties of well-labeled evergreens to be studied.

For layout and design of your property it is, of course, best to use professional help. An informed feeling for garden space can help achieve wonders in time, saving you false starts and the little disasters which inexperience too often brings.

The qualified landscape architect can develop the best use of land in relation to individual need and individual site and budget. A plan may be developed over a period of time.

Remember, there is nothing static about plants and that this variety adds to the joy of being a gardener.

Let's Grow Gladioli

LEE J. ASHLEY



'Atom' gladiolus

FLOWERS ARE GROWN primarily for their beauty. No other flower in existence has such an extreme range of sizes, beautiful colors and exquisite forms as the gladiolus. It is among the most versatile flowers.

A few corms will fill in a bare spot in the flower border or a row in the cutting garden can furnish cut flowers and corsage material throughout the summer.

For arrangement material the gladioli are hard to beat, since they come in so many sizes and colors. All are easy to grow, requiring only a few rules for success.

CULTURE

1. Full sun all day or nearly so.
2. Plenty of water especially soon after planting and when coming into bloom. Do not plant in hot dry soil. If you can't water, use mulch of some kind, this keeps the soil cool, too, which is beneficial.
3. Good drainage — gladioli can't stand "wet feet".

4. Gladioli will grow and do fairly well in anything from sand to heavy clay but good loam is better. If you have a sandy or clayey soil, the addition of organic matter will help.
5. Fertilizer is needed if your soil is unusually poor, but don't overdo it. Any commercial fertilizer is satisfactory as long as it does not contain too much nitrogen. Water is really more important than a lot of fertilizer.
6. Thrips. When your buds dry up and don't open, the trouble is thrips — small insects that suck the juices from the plant. You can spray or dust with DDT or chlordane to prevent them but a simpler and easier way is to scatter chlordane in the trench at planting time. One pound of 10% chlordane will be enough for 125 to 150 feet of row.
7. Start with good corms. Beware of pre-packed bargain corms. Many such corms are large old ones discarded by commercial growers because they are past

their prime. Large, especially flat ones are generally *not* the best. They are more subject to disease, harder to acclimate to your soil and often produce inferior spikes. Gladiolus corms of most varieties are best at $\frac{3}{4}$ to $1\frac{1}{2}$ inches in diameter. They produce more cormels (small corms) and last longer. Medium and small corms usually produce fine spikes and give better results.

8. Planting. Plant from 2 to 6 inches deep depending on soil and size of corm. The larger the corm and the sandier the soil, the deeper the planting depth should be. Space 3 to 6 inches apart, also depending on the size of the corms. Always plant right side up. For a longer blooming season, plant at intervals from April 15th until June 15th. Cormels can be planted from April 1st on.

Modern varieties of gladioli are far superior in beauty to the old timers. Florists should be using some of these new ones as there is new beauty of form as well as color.



'Morning Sun' gladiolus

RECOMMENDED VARIETIES

ALL-AMERICA GLADIOLI. The gladiolus people have an All-America test program in which they test gladioli all over the country much the same as the All-America Roses are tested. Each year several are selected as the outstanding gladioli in the program. This year there are three: 'La France' is a fresh, cool pink and white of heavy texture, intensely ruffled with seven to nine blossoms; 'Snowsprite', a dainty miniature, as lacy as a snowflake, is a sparkling white with a greenish tint; and 'Blue Sapphire', a "Rhapsody in Blue", is like a reflection in the summer sky — a smooth light blue with a cloud puff throat. 'Blue Sapphire' blooms early and is a vigorous grower.

Some of the former All-America Gladioli are: 'Victory', 1963, glowing scarlet; 'Morning Sun', 1963, a bright-as-the-sun deep yellow with eight or nine open florets; 'Goldilocks', 1963, miniature in a waxy golden color of sculptured form and fine growing habits; 'Frisky', 1963, easily opens seven or eight deep-velvety, scarlet florets on straight slender spikes. Try these and other All-America winners for a real treat.

A few of the time-tested gladioli that are inexpensive and give good results in our area are as follows:

- White — 'Snow Velvet', a pure white
- Green — 'Green Ice', cool green
- Cream — 'Landmark', (All-America) giant cream
- Light Yellow — 'Prospector'
- Deep Yellow — 'Morning Sun', (All-America)
- Orange — 'Fortune', huge orange
- Salmon — 'Thunderbird', (All-America) vibrant salmon-orange
- Scarlet — 'Victory', (All-America)
- Light Pink — 'Pink Prospector', luscious cream-pink
- Medium Pink — 'Friendship', probably the most planted gladiolus today
- Deep Pink — 'Spic & Span', old but widely grown commercial pink

Light Red — ‘Happiness’, (new) by far the best in this color
 Dark Red — ‘Winnebago Chief’, giant red
 Medium Rose — ‘Ben Hur’, (All-America)
 Deep Rose — ‘Joyous’, (All-America)
 Black Red — ‘Last Rose’, (new) wonderful gladiolus
 Lavender — ‘Lavanesque’, fresh lavender
 Purple — ‘King David’, beautiful red-purple
 Light Violet — ‘China Blue’, (All-America)
 Smoky — ‘Rusty’, (All-America)

The top rated miniatures are: ‘Red Ribbon’, red; ‘Parfait’, salmon; ‘Tow-head’, yellow; ‘Camelot’, pink; ‘Little Fawn’, tan; ‘Domino’, cream; ‘Statuette’, yellow; ‘Susie’, lavender; ‘Little Diamond’, scarlet; and ‘Zig Zag’, red. All are easy growers and display a new dimension in gladioli.

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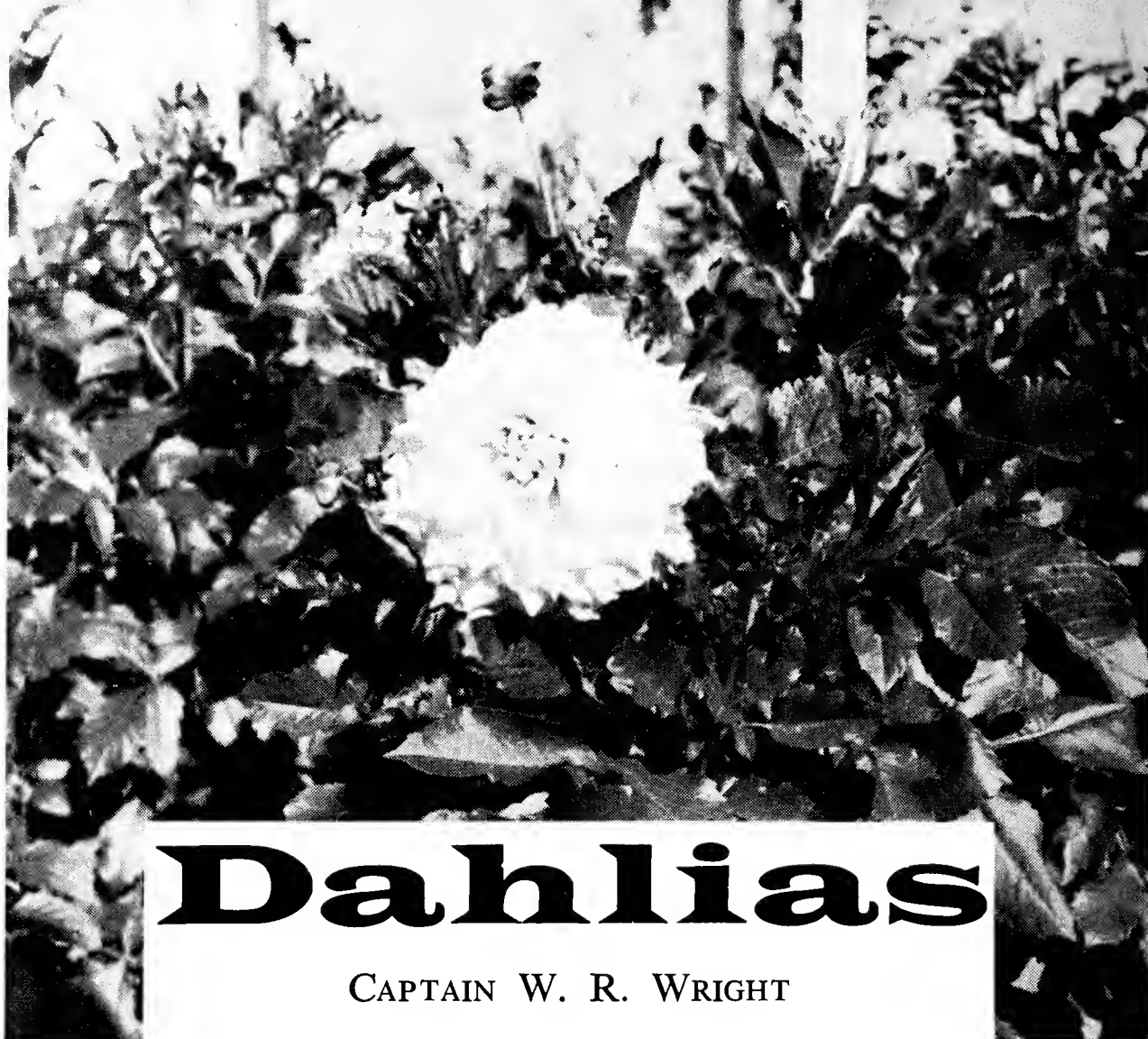


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Dahlias

CAPTAIN W. R. WRIGHT

DAHLIAS are among the world's favorite garden flowers. They grow well in almost any type of soil throughout the Denver area. They will provide you with excellent cut flowers from late July until killing frosts. The smaller varieties, pompons, miniatures and florist types (BB's), will often produce several hundred blooms on a single plant during a season.

Dahlias are classified by types of bloom and size. Decorative types have broader petals than the narrow spike petals of the cactus types. There are also other types of dahlias: the old fashioned ball or round dahlias, collar-ette, single and anemone types. The sizes range from the pompons which are 1 to 2 inches in diameter to the A size which are 9 inches or more in diameter.

CULTURE

In general, you observe the same rules in planting and growing dahlias that apply to other garden flowers. There are only two musts — good drainage and direct sunlight.

In order to assist new gardeners who

wish to plant dahlias, a set of very brief instructions follow:

Selection of roots — Buy good roots of recognized varieties from a reputable dealer. You may find good roots at the supermarket, but they are not recommended unless you are familiar with the varieties. This year there will be two plant sales where dahlia roots may be purchased. The Denver Botanic Gardens Plant Sale on May 9 and 10 will have an excellent assortment of roots for sale at reasonable prices. Most of the varieties offered for sale were among those grown in the dahlia garden at the Botanic Gardens last summer. In addition, there will be a smaller sale at the Dahlia Society meeting on May 21. The Dahlia Society meets on the third Thursday of every month, at 7:30 p.m. at Botanic Gardens House. Everybody is welcome.

Soil Preparation — Dahlias grow well in a wide variety of soils. A high percentage of sand is ideal but not necessary. Spade the entire plot two weeks before planting, turning under humus, leaves, sand and fertilizer.

Drainage — Drainage must be good, otherwise the roots will rot.

Fertilizer — Manures or organic fertilizers are excellent. Commercial fertilizers containing *all* three major elements, nitrogen, potash and phosphorus, can also be used. Be certain that you have enough potash and phosphorus to offset the effects of an excessive amount of nitrogen.

Where to Plant — The planting site should have free circulation of air to prevent mildew and direct sunlight at least three or four hours a day. Dahlias should not be planted close to large trees or dense shrubbery which might compete for the available moisture and nutrients.

When to Plant — After the ground is warm enough so that roots will not rot or plants will not be killed by a late frost — probably after May 10 in Colorado.

How to Plant — Large flowering dahlias should be planted 30 to 36 inches apart, small flowering dahlias 24 to 36 inches apart. Mix small amounts of fertilizer, sand and compost with the soil in the bottom of the hole. Drive a stake in the hole to support the plant. Place the root with the "eye" end about 1 inch from the stake and 4 to 5 inches deep, making certain that the root is *not* in contact with any fertilizer. Fill the hole with loose soil.

Cultivation — Cultivate about once a week early in the season to keep the weeds down. When the plant is about 6 inches high pinch out the crown, leaving about two or three sets of leaves. This will produce a better plant with sturdier stems. When the plant gets a foot or so high you can tie it loosely to the stake. As the growth progresses you may have to tie the dahlia to the stake several times. Disbud only the large types of dahlias, the B's and A's. It is an excellent idea to

mulch dahlias with leaves, straw, black paper or some other suitable material. Mulching will save cultivating time, conserve water and prevent grass and weeds.

Water — Water well about once every seven to ten days.

Pests — Pests may eat the flowers, stems, leaves or carry plant diseases which will stunt the plant. They must be destroyed by spraying. The most common dahlia pests are:

Aphids, leaf hoppers and thrips. These tiny insects carry mosaic disease, suck the juices from the leaves and stems and cause the leaves to become gnarled.

Red spider mite. These minute pests usually work on the underside of the leaves giving them a gray appearance. They multiply very rapidly in dry, hot weather.

Malathion (10% wettable), benzene hexachloride and Aramite are among the spray chemicals that can be used to control the above described pests. Spray your dahlias when you spray your roses and shrubs.

Cutting flowers — Cut blooms in the late afternoon or early morning, removing the lower leaves and all buds. Immediately place them in cold water in a dark, cool place for four hours or over night to harden the stems. Dip the ends of the stems in hot water for one or two minutes being careful not to expose the blooms and leaves to the steam. Following this treatment, the blossoms are ready to be displayed in the house or entered in a flower show.

Classification of dahlias by size

A — 9 inches in diameter and over.

B — 6 to 9 inches in diameter.

BB — 4 to 6 inches in diameter.

Miniatures — 2 to 4 inches in diameter.

Pompons — Under 2 inches in diameter.

Classification of dahlias by flower type and color

ID — Informal decorative.

FD — Formal decorative.

IC — Incurved cactus.
 SC — Semi-cactus.
 StC — Straight cactus.
 Bi — Bicolor.
 Var — Variegated.
 Bl — Blend.

**MODERATELY PRICED
 RECOMMENDED VARIETIES**

A's — 9 inches in diameter and over

'Pride of Holland' — StC — Pink
 'Margaret Duross' — FD — Autumn
 'D'Arcy Sainsbury' — FD — White
 'Mrs. Hester Pape' — ID — Dark red
 'My Doris R' — ID — Yellow
 'Night Editor' — ID — Pink
 'Lula Pattie' — ID — White
 'Lavengro' — ID — Lavender
 'Surprise' — SC — Pink
 'Danny' — IC — Pink

**B's — 6 to 9 inches in diameter BB's —
 4 to 6 inches in diameter**

'Ballego's Glory' — BFD — Dark blend
 'First Lady' — BFD — Yellow
 'Juanita' — BStC — Red
 'Para Tahi Sunrise' — BBStC — Flame
 'Duet' — BID — Bicolor
 'Gerrie Hoek' — BBFD — Pink
 'Golden Heart' — BSC — Flame
 'Wagschals Goldkrone' — BIC — Autumn

'Windlassie' — BID — White
 'Autumn Brumoc' — BFD — White
 'Miss Rose Fletcher' — BBStC — Pink
 'Tuki Yori Nu Shesha' — BIC — White
 'Flame Tartan' — BFD — Bicolor
 'Nita' — BStC — Variegated

Miniatures — 2 to 4 inches in diameter

'Jescot Tangerine' — FD — Orange
 'Rondeur' — FD — Dark blend
 'Decoy' — FD — Flame
 'Hulin's Carnival' — FD — Variegated
 'Ike' — FD — Red
 'Ruby Charm' — SC — Red
 'Frank Soeten' — StC — White (Bedder)
 'Silver Spring' — FD — Pink
 'Park Princess' — StC — Pink (Bedder)
 'Kosenesio' — SC — White
 'Jenny Johnson' — SC — Dark black

Pompons — Under 2 inches in diameter

'Baseball' — White
 'Clarisse' — Orange
 'Margaret William' — Lavender
 'Little Edith' — Flame
 'Pom of Poms' — Red
 'Leslie Marks' — Yellow

Other types

'Bishop of Llandaff' — Peony — Red
 'Comet' — Anemone — Red
 'La Cierva' — Collarette — Pink and white
 'Helen Hanneman' — Single — Variegated



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ANNUALS

A

to

Z

EDNA LUCAS

FROM AGERATUM TO ZINNIA the best varieties of annuals suited to this area will be offered at the 1964 plant sale to be held at the York Street Unit of Denver Botanic Gardens May 9 and 10.

Choice varieties of plants have been carefully selected with Dr. A. C. Hildreth and Mike Ulaski advising on the basis of their experience in growing these outstanding varieties and on the basis of visitors' comments here at the Botanic Gardens and in the Denver parks.

Ornamental kale, with foliage blending from shades of rose to green, a most sought-after foliage plant for flower arrangements, is featured for the first time in this area. Ornamental kale has been grown successfully in Denver for several years but has been unavailable commercially.

New introductions awaiting tests at the Denver Botanic Gardens and in your garden are: 'Lime Sherbet', a

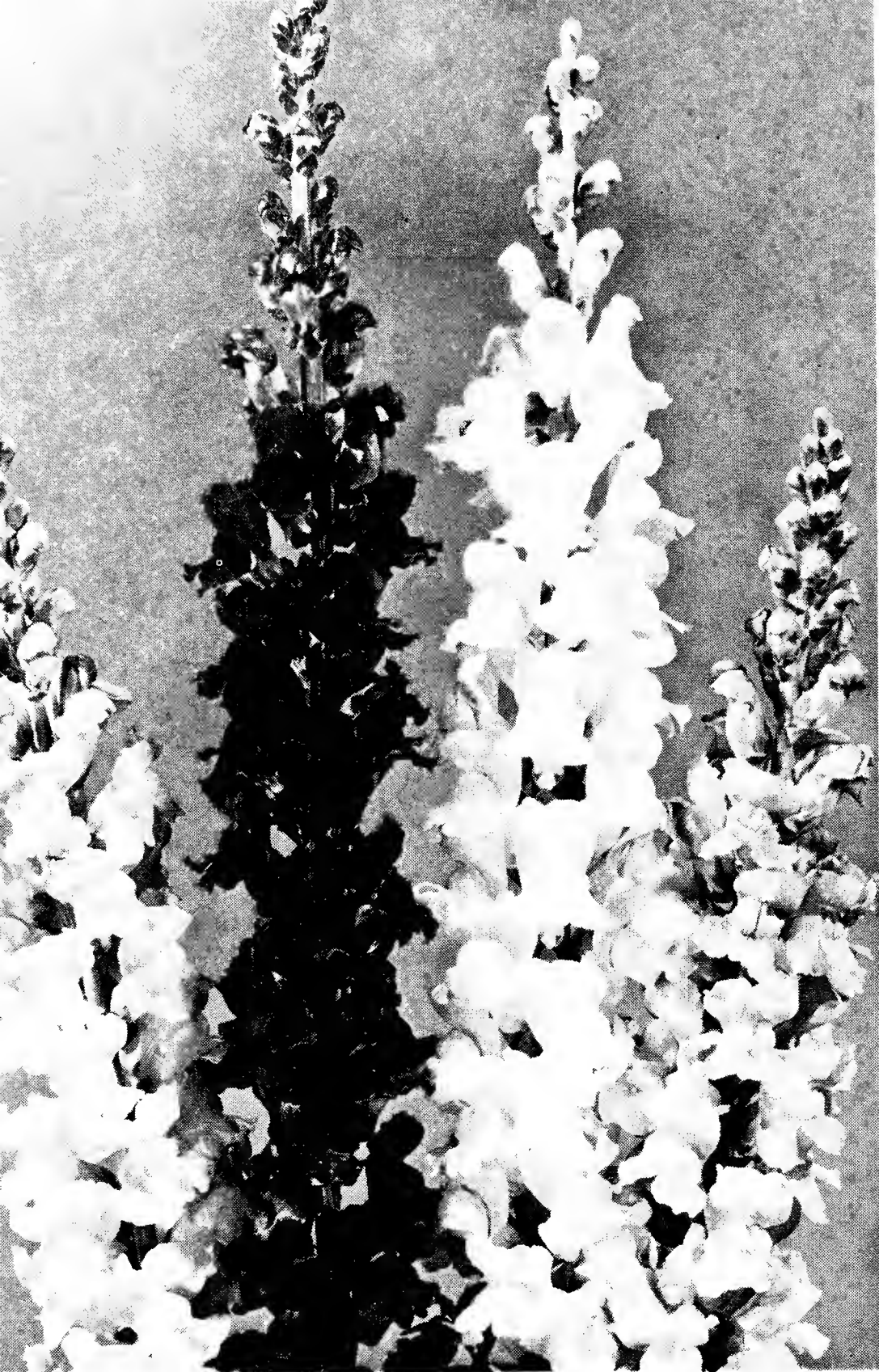


'Lime Sherbet' nicotiana

flowering tobacco with 18-inch spikes of lime-green blossoms: 'Irish Lace', a novel edging marigold for sun or shade developed for its lacy foliage and the All-America cockscomb 'Fireglow', with carmine-red crested flowers, light green foliage, about 18 inches tall, which lends distinction to the garden and to flower arrangements either fresh or dried.

Among the petunias selected for sale 'Seafoam', single white, the best performing petunia in the test trials here for four successive years, boasts excellent substance in exceedingly large blossoms and flowers freely. An early sell-out last year, its quantity has been doubled. 'Purple Waters', single velvet petunia, outperformed all other varieties in its color class and created much favorable comment.

'Improved Comanche', the best red bedding petunia, has led other red varieties since its introduction three years ago. Among the dozen single varieties



Above Left — Snapdragons
 Above Center — Pansies
 Above Right — Gloriosa Daisy





Below Left — Double Petunia
 Below Left Center — Verbena
 Below Right Center — Celosia
 Below Right — Grandiflora Petunia



offered are: 'Maytime', most reliable pink; 'Satellite', pink with white star, and new 'Peaches 'n Cream', peach outer edge blending to a creamy center.

Double petunias will include saucy 'Cherry Tart' (pink and white), 'Lyric' (salmon) and 'Sonata' (best double white).

Cheaper by the dozen are bedding and pot geraniums available in seven colors from darkest red through salmon, pink and white. Ivy-leaved or vining geraniums are offered in lavender, rose and white.

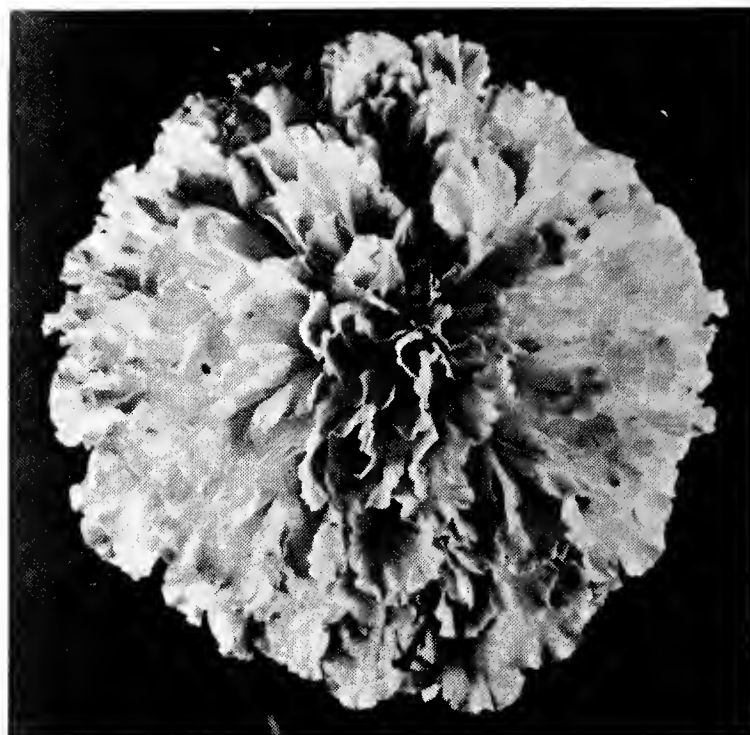
Hanging baskets, so popular last year, will feature predominately white, rose or lavender blossoms. Baskets prepared especially for shade are available by advance order.

Chosen for adaptability to hot, dry locations are *Nierembergia* 'Purple Robe'; *Portulaca* (rose moss) available by color in white, pink, red or yellow as well as mixed; and *Vinca rosea* 'Coquette', rose, and 'Little Bright Eye', white with red eye, both 10-inch high, border-type periwinkles. These plants are pleasant nestled among rocks. Verbenas, a highlight of color at the Botanic Gardens last year are being grown in pure white, as well as in red, lavender or purple with sparkling white eye. The porcelain-like blossoms of *Dimorphotheca*, commonly known as cape marigold or African daisy, will be sold in white and salmon.

Dwarf sweet William will include the new 'Baby Doll', 6 to 8 inches high in true dianthus colors and charming 'Wee Willie', measuring 3 inches, in deep rose pinks.

Pansies and violas are offered by color as well as mixed. The dainty *Torenia*, wishbone flower, with its velvety purple blossoms also tolerates shade and is suitable for rockeries or borders.

Marigolds will range from the 30-inch 'Yellow Climax' with its flowers



'Sun Souffle' marigold

5 inches across to the intermediate 'Tangerine', best by test at Denver Botanic Gardens, to the miniatures 3 to 5 inches high.

Offered for contrast with evergreens, both upright and spreaders, are fiery salvias so popular at the parks and Botanic Gardens, celosias in golden plumes and vivid red and rose cockscomb, plus the foliage-plant coleus in rich reds or yellow.

'Dark Opal', the maroon-foliaged basil so effective at Washington Park last summer, should not be confused with the herb-grown basil offered at the Herb Booth.

Gloriosa daisies will be sold in gold or mahogany along with their sister *Rudbeckia* 'Tahoka' in bright blue. Snapdragons include the outstanding rockets, new hit parade varieties 'Stardust' and 'Mexicali Rose' and popular doubles including 'Venus', pink with yellow lip.

Zinnia 'Red Riding Hood', the best button at 18 inches, 'Pride of Dieldrin', one of the best at the Botanic Gardens, 'Old Mexico' with unusual narrow foliage and giant cactus varieties 'Red Man', 'Sunny Boy' and 'Riverside Beauty' are among those offered for sale.

Completing the list of annuals are dwarf pot asters, seed dahlias, dusty miller, alyssum and fountain grass.

These select varieties of annuals are being grown especially for this sale and will be available on advance order or at the sale May 9 and 10. By using the advance order form which will accompany the *April Green Thumb Newsletter* discriminating gardeners are assured choice plants for a successful gardening season and at the same time will insure the continued successful growth of Denver Botanic Gardens.

Let's grow together!

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Hardy cushion and English type chrysanthemums in many colors are offered in field-grown clumps. Varieties available are outstanding in hardiness and performance in this region. Many were developed at the U.S.D.A. station in Cheyenne.



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Roses For 1964

CLYDE E. LEARNED



IN *The Green Thumb* of March 1963 the writer furnished rather complete lists of roses in the hybrid tea, grandiflora and floribunda classes which do well in this Rocky Mountain region. It is believed that these recommended lists are still satisfactory for 1964 selections.

However, during the past few years there have been a number of new roses introduced which warrant consideration, and it is quite probable that many of our readers would enjoy growing them.

A list of ten of these recommended new roses follows. The first two roses suggested are the All-America selections for 1964.

The first is 'Granada', a truly beautiful multicolored orange and red blend hybrid tea. This large, vigorous plant with its fragrant, high-centered blooms and its deep green, semi-glossy foliage is highly recommended for this region.

The second All-America selection is 'Saratoga', a pure white floribunda, gardenia-like in appearance, which has long stems for use in bud vases. The plant is 2 to 3 feet in height and has glossy, green foliage. Although this rose is rated by some people as excellent, it is, in the writer's opinion, not as satisfactory as 'Ivory Fashion' which is still considered the top white floribunda rose for this area.

'Chicago Peace' (hybrid tea) This beautiful and attractive color sport of 'Peace' would be a real addition to any rose garden in this area. The bush is a vigorous grower and has glossy, leathery-like foliage. The large blooms are pink, canary-yellow and cream and are actually deeper in color than 'Peace'. All indications are that this plant is very disease resistant and in my opinion is a very desirable rose to have in your garden.

'Lucky Piece' (hybrid tea) This bush is also a sport of 'Peace' and is very attractive. The coloring of the blooms is quite similar to 'Chicago Peace' and is a mixture of pink, yellow and salmon. The globular blooms hold the petals very well and are quite fragrant. The compact bush is about 3½ to 4 feet tall and has dark green to bronzy foliage which appears to be very disease resistant. This bush, which has more color than its parent, 'Peace', is also recommended for gardens in this region.

'Oriental Charm' (hybrid tea) This German introduction is actually a standout red rose in the 8 to 12 petal group. The bush grows upright and has fine abundant foliage. When in bloom the red flowers resemble an Oriental poppy and are very attractive. The main objection to this variety is

that the full bloom flowers fade rather quickly. This rose is suggested for those who want something beautiful and different.

'Ann Letts' (hybrid tea) This excellent pink-blend rose with silver shading is classed as a fine exhibition rose. The bush is erect, has good strong thorny stems and the substance of the flowers is excellent. The foliage is glossy and very satisfactory. Although there were not many growers of this particular variety in this area, all persons who did grow it were very enthusiastic as to its excellent qualities.

'Gaujard' (hybrid tea) This magnificent French rose which is a cross of 'Peace' and 'Opera' has performed very well in my garden. The double bi-colored blooms are high centered and the petals are tinted with cherry-red and white. The plant is about 30 inches high and has good foliage. The blooms are quite similar to 'Kordes Perfecta' but are more dependable as to coloring and formation of the bloom.

'Floriade' (hybrid tea) This beautiful scarlet-orange rose is a sport of 'Montezuma' and was introduced into this country from Holland. The bush is a compact vigorous grower 3 to 3½ feet tall and has fine dark green, disease resistant foliage. The bush has many blooms which are borne singly and in clusters on strong stems. I had a number of 'Floriade' and 'Tropicana' bushes in my yard next to each other and found it rather difficult at times to tell

the blooms apart. However, it was finally decided that the 'Floriade' blooms did not last quite as long or hold their color as well as 'Tropicana'. Both roses are wonderful and are highly recommended for Colorado gardens.

'Ole' (hybrid tea or grandiflora) This vivid orange-scarlet rose with its brilliant flowers grew about 24 inches tall in my yard and actually resembled a floribunda more than either a hybrid tea or grandiflora. The rose was a fair bloomer which did very well during the fall months. This was one of the most attractive, spectacular and eye-catching roses in my garden. The blooms held their color well and were long-lasting. The foliage was glossy dark green with a holly-like appearance. This rose is recommended for our region.

'South Seas' (hybrid tea) This rose has large coral-pink blooms with from 45 to 50 petals. The flowers are from 5 to 7 inches across and hold up very well. It has demonstrated that it is a continuous bloomer with many blossoms. The bush is about 3 feet tall and has large leathery foliage. As this bush appears to be disease resistant, has so many good qualities, and has made such a good showing, it is highly recommended for Colorado gardens.

When it comes to buying roses, my advice is to purchase them from the reliable nurseries and seed stores which guarantee their roses and which will replace them if they do not live after having been planted according to directions.



BOOK REVIEW

DR. HELEN
MARSH ZEINER

A RECENT ADDITION to the Botanic Gardens library is the book, *All About Begonias*, by Bernice Brilmayer. This book was published in 1960. While it is not "brand new", it is a much-needed book with very worthwhile information for any begonia fancier.

The book is intended for the home grower. It is written in a very readable way, so that the information and directions are clear-cut and easy to understand.

All About Begonias is a very complete book. There are good sections on classification and general culture. More than 600 begonias are described.

In addition to the discussion of general begonia culture, there are very good directions for the culture of specific kinds of begonias, including Semperflorens, Rex, Angel Wings, Rhizomatous, and others. Ten groups of begonias are included. Varieties are listed for beginners, for advanced growers, and for collectors.

The book also treats propagation, pests, uses for begonias, hybridizing, and exhibiting. It is nicely illustrated with black and white and colored photographs and with line drawings.

Anyone interested in begonias should see this book. You will find the answers to most of your begonia problems.

LEE CHAMBERS

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Annual and perennial herbs, so popular in previous years, will be available.

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In a relatively few years Harry Swift has made it possible to do just that — landscape with native ornamentals. By efficiently propagating native plants commercially he has spurred the movement of using these little-known natives in home and commercial landscaping.

Colorado blue spruce, one of the world's most magnificent evergreens, was recognized for its striking beauty in the nineteenth century. White fir and hybrids of Rocky Mountain juniper are extremely valuable. Colorado red osier dogwood is dramatic in winter and Colorado columbine is treasured wherever it can be grown.

However, scores of native plants, relatively unknown, would fill landscaping needs for new homeowners settled at the edge of the plains or nestled along the foothills from Laramie to Pueblo and south to New Mexico.

For the third successive year Denver Botanic Gardens is offering, at its an-

nual plant sale, shrubs, perennials and ground covers requiring low maintenance, easy culture and little water. Supplementing this list are many shrubs and flowers selected for their beauty and hardiness but not readily obtainable in this area.

Among the ground covers are *Mahonia repens* (creeping mahonia) and kinnikinnick, both broadleafed evergreens valuable for covering large areas. Sulphur plant and pussy toes are outstanding for their year around



Potentilla fruticosa



Juniperus horizontalis

foliage in rock gardens and as ground covers. Snow-in-summer, sedum in variety, bugleweed, leadwort, woolly thyme and creeping veronica (a gem with tiny blue spires) supplement the natives.

Gambel (scrub) oak and quaking aspen, recognized for their brilliant fall color, have proved hardy and useful in the garden. Buffaloberry, thimbleberry, alder, birch, New Mexican forestiera, mountain mahogany and Apache plume offer interesting flowers, catkins, berries or seed plumes to enhance a dry hillside. Bush cinquefoil is a jewel in its native form. Its close relatives will also be sold as *Potentilla* 'Gold Drop', bright yellow flowers all summer, and 'Katherine Dykes', soft yellow with gracefully arching branches. *Potentilla fruticosa dahurica*, white, is a sister from the Orient. Cliff rose, lead plant, skunk bush (three-leaf sumac), western chokecherry, five stamen tamarisk (escaped from cultivation) and

serviceberry (Juneberry) are valuable additions to the dry garden.

Among the introduced selected shrubs are *Cotoneaster apiculata*, 1 foot, and *C. integerrima*, 4 feet, both admired for their bright red berries. Arrowwood viburnum, dwarf winged euonymus and several Siberian pea shrubs will be offered, also native yucca, *Yucca baccata* and *Y. harrimani*.

D. M. Andrews Pioneered Use of Natives

The late D. M. Andrews of Boulder doubtlessly popularized Rocky Mountain natives more than any other man. His collecting expeditions for Harvard University, the Royal Botanical Gardens of Edinburgh and Kew Gardens in England, in the late 1890's and early 1900's, made Colorado natives better known throughout the horticultural world than in our own state.

Dr. A. C. Hildreth, George Kelly, William H. Lucking, and the late Kathleen Marriage and M. Walter Pesman

are among the outstanding persons who pursued this study of collecting, hybridizing and increasing native plants by propagation in the Rocky Mountain region.

Now Harry Swift at Golden is making natives and other drought-resistant plants readily available to local nurseries and landscape architects. Kroh Brothers, in Loveland, have contributed to this work, especially, by seeking drought-resistant plants over the North American continent.

The landscaping at the United States Military Academy, Marathon Oil, Henritze's and along some Colorado highways has broadened the use of these plants. The National Park Service has developed areas at Arches National Monument and Glen Canyon Dam with native material. To illustrate their ruggedness a check of plantings made 10 years after the development of a roadside park along U.S. 85 showed 31

species of native plants were still growing without care.

Your election to purchase some of these selected plants at the sale, with competent sales personnel assisting, will promote popular use of these hardy plants, solve your problems for happy, more carefree gardening and expand the growth of Denver Botanic Gardens.

Let's grow together!

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GLADIOLI

Choice varieties of gladioli, proved most satisfactory for our area, have been selected for the sale by Lee Ashley, who supervised the trial plantings at Denver Botanic Gardens. Members of the Gladiolus Society will handle sale of these corms and furnish information on their culture.

DAHLIAS

Holland grown tuberous roots imported especially for this sale have been selected by Capt. W. R. Wright, who supervised the dahlia plantings which provided the delightful show at Botanic Gardens last fall. Members of the recently organized Dahlia Society will handle sale of these tuberous roots and give advice on their culture.

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Hybrid Lilies

EVELYN F. JOHNSON

IF YOU FAILED to get some of the new hybrid lilies planted last fall be sure to do so this spring. The traditional lily planting time has always been September, October or even later. With the advent of modern packaging and handling techniques, spring planting has been made possible and quite successful. We planted several varieties in our garden last April which bloomed beautifully, though somewhat later than those that were set out in the fall.

Clumps of lilies fit nicely among other perennials or annuals in a border or flower bed. Groups of them may be planted near certain other perennials so that they will bloom together for desired color combinations, such as blue or purple delphiniums with white or yellow trumpet lilies. Another use may be made of them by interspersing groups among tulips, daffodils or hyacinths so that their bloom takes over when the earlier flowers die back. Some perennials look especially good when planted with lilies. Among these are hostas, coral bells, columbines, thalictrums and *Sedum spectabile*. Shallow rooted ground covers planted among the lilies help to keep the soil shaded and cool. Violas, *Vinca minor*, *Phlox subulata* and others may be used for this purpose. Small bulbs such as crocuses, grape hyacinths and scillas serve the purpose also.

The old belief that lilies must be grown in shade is being disproved in

the case of the hybrid varieties. We are finding that most of these hybrid varieties have more flowers and stronger and straighter stems when grown in the sunshine. When grown in too much shade the stems, when weighted down by the heavy flower heads, tend to lean toward the light and require unsightly staking. If the soil over the bulbs is kept shaded and moist by a good mulch most of the varieties can take a good deal of sunshine. Some of the large trumpet varieties should be grown in light shade to protect their delicate coloring.

If most perennials and annuals do well in your garden then you may expect lilies to thrive there also. This is true, even though they insist, more than most plants, upon good drainage and rich soil. If your soil is heavy and clayey the planting space should be deeply trenched and sand, peat and manure added and mixed thoroughly into the original soil.

In order to make a satisfactory showing the bulbs should not be planted singly but in groups of three to five bulbs of the same variety. These should be spaced 10 to 12 inches apart in a circle so they will give the effect of a large clump when in bloom. The depth to set the bulb is determined by the size. The general rule is three times the depth of the bulb. Most flowering size bulbs should be covered with 4 to 6 inches of soil. After they are planted, the soil over them should be heavily



Tiger Lily

mulched with decayed manure or leaf mold to keep the soil from baking and to provide additional organic matter. Because lilies are such heavy feeders, in spite of their dainty appearance, a good commercial fertilizer should be applied two or three times a season. This will insure large flowers and a good bulb for the next year.

Most of the hybrid lilies are hardy and do well in our area. Varieties may be selected so that they come into bloom at different times, from late June to September, thus making it possible to have color from lilies all summer long. The first ones to bloom here

are the colorful Mid-Century hybrids which start in late June and continue through most of July. They are of medium height and many brilliant shades of red and yellow can be found among them. 'Enchantment', one of the best known of these, is a vibrant nasturtium-red and makes a striking picture. Other outstanding reds are 'Cinnabar' which is maroon-red and 'Sunstar', a dazzling vermilion-red. The last two bloom a little earlier than 'Enchantment'. Two good lemon-yellows are 'Prosperity' and 'Destiny'. 'Joan Evans' is a later blooming golden-yellow. The Fiesta hybrids give a light gay effect

with their nodding reflexed flowers sprinkled with small maroon-black dots. The colors are yellow, orange or red.

The majestic trumpet lilies should be planted at the back of the border as they grow quite tall and stately and produce delicately colored, fragrant flowers. The large number of new varieties and colors makes it difficult to make a choice. There are pure whites such as the Olympic hybrids and the new improved Regal hybrids which will surprise you with their size and substance. 'Black Dragon' and 'Black Magic' have beautifully formed flowers with black-purple markings. Green and chartreuse shadings mark 'Green Dragon' and 'Green Magic'. 'Royal Gold' is a smooth yellow Regal hybrid. Taller lilies of gold or yellow color include 'Golden Clarion', 'Moonlight' and the chartreuse-yellow 'Limelight'.

Varieties which bloom late, during the month of August, include the Sun-

burst strain which has large, flaring reflexed flowers in many yellow, orange and apricot shades. 'Golden Sunburst' and 'Thunderbolt' are among the newer varieties. Another August bloomer is the vivid orange 'Gingersnap', a Tiger Lily hybrid with Turk's-cap-black spotted flowers.

Last fall we planted some new August blooming Speciosum hybrids that are said to be more hardy and vigorous than previous strains. We are looking forward to seeing the spectacular white and red blossoms of 'Jamboree' and the Red Band hybrids this summer. The Imperial hybrids are also new to this class.

Do plan to add some of these decorative and distinctive plants to your garden this year. If you can't do it this spring, visit local gardens this summer to choose the varieties you like best so that they can be planted in the fall for next summer's blooms.

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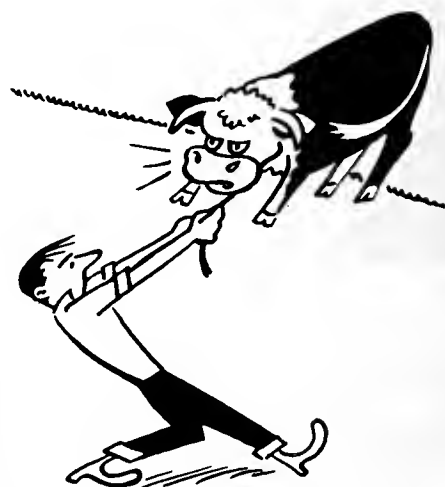
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In Colorado by act of the legislature, March 22, 1889, the third Friday in April of each year was designated as Arbor Day. Since then the day has been best observed in the public schools by the planting of a tree, often a class tree.

In April 1890, the blue and white columbine, *Aquilegia coerulea* was named the state flower, having been selected by the vote of the school children. On Arbor Day 1892, the blue spruce, *Picea pungens* (a beautiful conifer found only near mountain streams in the Rocky Mountains), was chosen the state tree.

The protection of our forests and the planting of trees around our homes, in our parks and around public buildings is as important today as when the first Arbor Day was established. And this stresses also the necessity of replacing



Colorado blue spruce

every tree that is destroyed by the construction of buildings and highways.

Let us, each one, this April plant at least one tree, carefully chosen and put in the right place.

In the words of J. Sterling Morton, the founder of Arbor Day: "All other anniversaries refer to the past and its dead. Arbor Day alone deals with the present and the future. It stretches its sheltering shades over the unborn millions of coming generations and in the voices of the leafy woods pronounces benediction upon posterity."

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A Publication of Denver Botanic Gardens

MAY

1964



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THE COVER

Pasqueflower (*Pulsatilla ludoviciana*)
Original drawing from the
Emma A. Ervin Collection.



CLEMATIS

FOR COLORADO

GEORGE W. KELLY

THE FACT THAT there are several species of clematis native to Colorado has led us to believe that others, from similar climates, might also thrive here. Through experimenting and modifying some of our cultural methods we may discover which of these foreign species can be made to "feel at home" in Denver. All clematis seem to like to have their "heads" in the warm sun and their "feet" in cool soil, so we try to arrange a spot for them where the soil is loose, moist and shaded by other plants or buildings. Peat and sand added to ordinary good soil, if it is in a well-drained location, will make a good medium in which to plant clematis. Watering will be easy and little additional fertilizer will be needed if the soil is properly prepared.

The clematis that can be grown in Colorado may be divided into four general classes: small-flowered vines, medium-flowered vines, large-flowered vines and the non-vining types.

Small-Flowered Vines

Clematis paniculata, the sweet autumn clematis, is the most useful of the small-flowered species. An extremely vigorous grower, it will cover large areas of fences, pergolas and trellises in a few years. The flowers are small, white, profuse and delightfully fragrant. The fluffy seed heads, which follow the flowers, cover the plant and remain into the winter. This species usually dies back partially in the winter but will come up again vigorously with the advent of warm spring weather.

Clematis ligusticifolia is a native Colorado vine with flowers similar to *C. paniculata* but with larger seed heads and no fragrance. This species blooms in August or September, a month or so

earlier than *C. paniculata*. It is also more tolerant of alkaline soil and hot winter sun than *C. paniculata*. A similar species, *C. virginiana*, is native in the eastern United States.

Medium-Flowered Vines

Some of the most interesting, if not the most conspicuous, species belong to the medium-flowered class. Of these, the scarlet clematis, *Clematis texensis* (*coccinea*), is probably the most attractive. It is a rather frail appearing vine, climbing to nearly 6 feet and is covered throughout the summer with small, red, urn-like flowers that look as though they never fully open. Similar in habit is the curly clematis, *C. crispa*, with purple, bell-shaped flowers.

Clematis tangutica and *C. orientalis* are both very vigorous vines with open, yellow, star-like flowers, 2 to 3 inches in diameter. *Clematis orientalis* has escaped in places, notably in the vicinity of Idaho Springs and, for miles along the road and stream beds, has crowded out less attractive plants. *Clematis pseudoalpina* is a very frail vine which is found growing in the dense shade in our mountains. The flowers are generally a pale lavender but are sometimes almost white or purple. *Clematis montana*, a native of Asia, has rose-pink flowers which are borne on the previous year's wood. This species, like many others, dies rather far back during the winter. For this reason, it is not so well adapted to our climate as *C. pseudoalpina* which produces flowers on the current year's wood.

Large-Flowered Vines

The very conspicuous, large-flowered class is represented most frequently in Denver by the popular *Clematis jackmani*. We have found, in recent years,

that we may greatly extend our variety of flower color and character available in this class if the proper soil situation and care are given. Included in the popular purple varieties are: 'Gypsy Queen', 'Lady Betty Balfour' and 'Lord Neville'. 'Crimson Star', 'Ernest Markham', 'Mme. Edouard Andre', 'Ville de Lyon', 'Henry Chapin' and *C. jackmani rubra* are among the most popular of the red-flowering types. Of the white-flowered types *C. lawsoniana henryi*, with its big, flat saucers of bloom, is most often planted. Other white-flowered types include: 'Duchess of Edinburgh', 'Fairy Queen' and *C. lanuginosa candida*. Popular blue-lavender types are: 'Mrs. Cholmondeley', 'Ramona', 'Wm. Kennett', 'W. E. Gladstone' and *C. lawsoniana*. Included in the pink-flowering types are: 'Comtesse de Bouchaud', 'Mme. Baron Veillard' and the Hagley hybrids. 'Nelly Moser' and 'Belle of Woking' have mauve colored flowers.

Non-Vining Type

The non-vining clematis add a nice touch to the perennial garden. *Clematis recta*, which grows 3 feet tall and which is covered with small, white, star-like blossoms, is best known. Recently, the improved *C. recta mandshurica* has almost replaced the older species for use in perennial gardens. *Clematis heracleifolia davidiana* is a variety which has small, light blue flowers. It forms clumps approximately 2 feet tall and 2 feet across. The native *C. hirsutissima (douglasi)* grows about 18 inches tall and is covered with small, purple, bell-like flowers similar to those of *C. crispa*.

Provide the correct growing conditions for clematis and they will repay you with masses of beautiful blossoms.

DWARF and SEMI-DWARF FRUIT TREES

GUY FOX

THE FIRST REPORT on the performance of dwarf fruit trees in eastern Colorado appeared in the October-November 1962 issue of *The Green Thumb*. In this second report we will summarize data from 24 growers covering 156 apple trees. So few reports were received on dwarf peaches, pears, cherries and plums that the data could hardly be considered significant.

Here are a few of the impressions one gets from reading the reports of these 24 growers:

1. Half of the growers have young trees, only one or two years old. These growers are living in hope but are still uncertain of the harvest.

2. Some, with older trees, proudly report crops of 1 to 3 bushels of fine apples per tree.

3. Others reported difficulties: fire blight destroyed several trees; "winter-kill" eliminated several more; there was damage by hail. The 'Yellow Transparent', 'Lodi' and 'Jonathan' varieties suffer most from fire blight. Evidence seems quite clear that lack of sufficient moisture was responsible for the "winter-kill". The winter of 1963 was very dry, following a dry summer. Also, some soils and locations lose moisture more quickly than others.

4. But in most cases, trees are doing

well and growers are interested. Only one of the 24 growers has given up in discouragement and sworn to harvest his future apples from the super market. His apple trees, unfortunately, were a 'Yellow Transparent' and a 'Jonathan' — both highly susceptible to fire blight.

GROWERS — Of the 24 growers, 15 live in the Denver area, three in Longmont, three in Fort Collins, two in Greeley and one in Pueblo. One grower has a real orchard of 79 dwarf apple trees planted in 1958. All other growers have one to nine trees in their yards.

VARIETIES OF APPLES

'Yellow Delicious'	42
'Red Delicious'	34
'Jonathan' (including 'Jonadel', 'Jon-Grimes')	32
'Lodi'	9
'Yellow Transparent'	7
'Delcon'	7
'Red Melba'	4
'McIntosh'	4
'Red Gold'	4
'Stark's Earliest'	4
'Summer Delicious'	4
'Winesap'	1
'Wealthy'	1
'Dutchess'	1
'Baldwin'	1
'Early Red Bird'	1

Total.....156

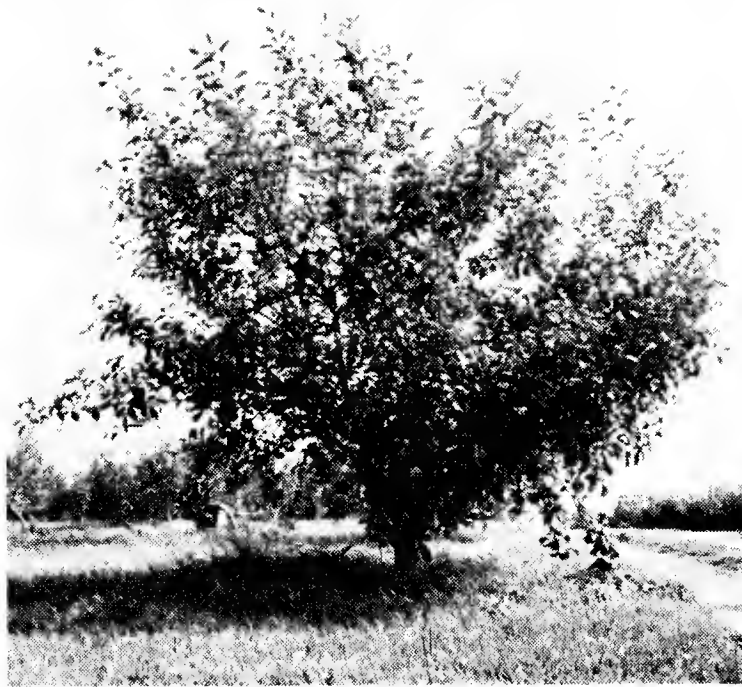
FIRST BLOOMING — Dwarf fruit trees are supposed to begin bearing early and these trees are living up to that reputation. The grower with the large orchard reported bloom the third year. Of the other trees, four bloomed the first year, 11 the second year, 10 the third and 14 the fourth year after planting. On the other hand, 27 trees had not bloomed either the first or second year and two had no bloom at three years of age. None had failed by the fourth year. It is well to note here that a good start after planting and favorable growth will make a difference in the time of blooming.

FRUITING — From the large orchard came the report of an excellent crop in 1963 of 'Yellow Delicious' apples. Other varieties produced only fairly well that year.

For trees three years of age or older, other growers reported fruiting for 1963 as follows: no fruit—four, dozen or fewer apples — 15, fair crop — 12, "loaded" — 10. Several stated that severe hail had destroyed or limited their crop.

HEIGHT — Trees four years and older seemed to vary in height from 7 to 14 feet.

SOURCES — Most of these trees came from two sources: Stark Brothers Nurseries, Louisiana, Missouri and Inter-State Nurseries, Hamburg, Iowa.



Dwarf Fruit Tree

Other sources were: Henry Field Nursery, Shenandoah, Iowa; Henry Leuthard, Port Chester, New York; Cottonwood Garden Shop, Littleton, Colorado; Willis Nursery, Ottawa, Kansas; Carlton Nursery, Forest Grove, Oregon; Montgomery Ward Nursery, Shenandoah, Iowa.

PERFORMANCE OF VARIETIES — Data are still too meager for hard and fast conclusions but a few impressions may be noted.

1. We have already commented on the susceptibility of 'Yellow Transparent', 'Lodi' and 'Jonathan' varieties to fire blight. This is a serious handicap in this region.

2. 'Yellow Delicious' seems to be a vigorous grower. No reports of fire blight.

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3. 'Red Delicious' also seems to be a vigorous grower. No reports of fire blight.

4. 'Delcon' received favorable comments. One tree, several years old and about 8 feet high, bore 2 bushels of fruits in both 1962 and 1963. It is a good apple for both cooking and eating.

Finally, the tentative conclusions stated in the first report still seem valid:

1. The interest in dwarf fruit trees seems to be growing — particularly, we

might add, with the city home owner who likes to grow things but has limited space and equipment.

2. The dwarf apple trees seem quite able to take our Denver winters.

3. The dwarf trees do begin bearing early, usually by the third year.

We might well add a fourth conclusion — they do take less space than standard trees and, with wise pruning, can be kept at a height convenient for spraying and for harvesting fruit.



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THE

POPPY

FAMILY

BEVERLY M. PINCOSKI and JOSEPH W. OPPE

THE POPPY FAMILY (Papaveraceae) contains approximately 25 genera which occur most frequently in the north temperate zone. Members of the family are characterized by having milky or colored sap, a calyx that falls when the flower opens and petals with the texture of crepe paper.

Almost all of the poppy family genera which are sold as ornamental plants are sold under the name of "poppy" or a combination thereof. For example, the genus *Papaver* includes the "true" poppies; *Stylophorum*, the celandine-poppy; *Glaucium*, the horned-poppy; and *Hunnemannia*, the Mexican tulip-poppy. Such indiscriminate use of the word "poppy" has led many people to believe that all "poppies" are herbaceous annuals, biennials or perennials. However, while most of the representatives of the family do come under this category, some do not. *Dendromecon rigida*, the bush-poppy, a woody shrub native to California, reaches heights of 2 to 10 feet and is grown for its bright yellow flowers. The Matilija-poppy (*Romneya coulteri*) is also a native shrub of California where it grows to heights of 3 to 8 feet. It is cultivated for its white, showy, fragrant flowers.

The poppy family is probably best known because of the notoriety of one of its representatives, the opium poppy (*Papaver somniferum*). The history of this drug-producing plant dates back to the beginning of recorded time. Homer, Hippocrates, Pleny, Theophrastus and other early authors discussed its attributes in their writings. The opium poppy has been cultivated for such a long time that its wild, ancestral form is unknown.

Crude opium is harvested by wounding the maturing seed capsule and collecting the coagulate which forms around the wound. The milky sap exudes from the wound and dries, forming a thin layer of gum which is then carefully scraped off with a scalpel-like instrument. Under good growing conditions the yield may be as high as 25 to 40 pounds of opium per acre. The world's production of opium is somewhere near 9 thousand tons a year. Of this total, 335 tons are necessary to fulfill medical needs, the remainder is used for non-medical purposes.

The analgesic qualities of opium are due mostly to the alkaloid morphine. This opiate is used medicinally to render portions of the body insensitive to

pain. When used for non-medical purposes, it creates pleasant feelings of peace and exhilaration.

The opium poppy is also the source of the poppy seed commonly used in cookery. These seeds also contain oil which is extracted and used commercially.

The opium poppy is cultivated, especially in India, China and the Mediterranean region, for the opium, seeds and oil which it produces. In the United States, the production of the opium poppy is generally controlled by the Opium Poppy Control Act of 1942 (Public Law 797, 77th Congress, 2d Session). This Act states quite simply that any person wishing to grow the opium poppy must be licensed, under the provisions of the Act, by the Secretary of the Treasury. Such licenses can only be issued when "the medical and scientific needs of the United States for narcotic drugs cannot be met by the importation of crude opium." According to Mr. George H. Gaffney, Deputy Commissioner of Narcotics, at the present time, "the medical and scientific needs of the United States are being met by the importation of raw opium from other countries and by production of so-called synthetic narcotic drugs. For these reasons, no licenses have been issued to grow opium poppies in the United States and it is not anticipated that any will be issued in the foreseeable future." The Act also prohibits the issuance of licenses for the production of opium poppies solely for poppy seed.

In the native Colorado flora, the poppy family is represented by two genera, the prickly poppy (*Argemone*) and the Iceland poppy (*Papaver nudicaule*). In addition to these natives, the California poppy (*Eschscholzia californica*) is commonly cultivated in our state and is reported as an escapee



Flower of the Oriental poppy.

and to have naturalized itself in many localities.

The most important members of the poppy family which are grown for ornamental purposes in Colorado are the Iceland poppy, prickly poppy, California poppy, Oriental poppy (*Papaver orientale*), and the Shirley poppy (a race of *P. rhoeas*). Of these, Denver Botanic Gardens have a fine collection of Oriental poppy varieties in their York Street Unit.

Oriental Poppy

In addition to the typical family characteristics, the Oriental poppy (*Papaver orientale*) is also recognized by its hairy flower buds, coarse, hairy, lobed leaves, subglobose seed capsules and the prominent, expanded, disk-like stigma that extends over the openings of the seed capsule. These capsules, which begin appearing in July, represent one of the most interesting features of the Oriental poppies.

The Oriental poppy, a perennial, is usually propagated by the division of root clumps. The root clumps of mature plants are divided into smaller sections and these are replanted in suitable locations. Another method of propagation is by root cuttings. These cuttings are made by slicing the root into 4-inch sections, dipping these in sand to halt bleeding and then planting them, right side up, in pots or directly into the garden. The gardener who does not want to be bothered with propagating will find a wide assortment of good varieties available from local nurseries.

Oriental poppies can be planted from August until the ground is frozen. Select a planting site in the full sun or partial shade. The area should have good drainage or the roots, if they remain soggy over long periods of time, will rot. The roots are set 3 inches below the surface of the soil. Organic material such as peat or leaf mold may be incorporated into the back-fill. The roots should receive a good watering following planting.

VARIETIES OF THE ORIENTAL POPPY BEING GROWN AT THE YORK STREET UNIT

Red

- 'Arab Chief' — dark red with purple overlay, ruffled petals.
- 'Burgundy' — deep wine or maroon-red.
- 'Claude Fox' — dark crimson.
- *'Cowichan' — turkey-red.
- *'Crimson Pompon' — red, double.
- 'Crimson Giant Flame' — red, large flowers.
- 'Empress of India' — deep scarlet-red.
- 'John III' — coral-red, low growing.
- 'May Curtis' — deep rose-red.
- 'Red Crinkles' — deep red, crinkled petals.
- *'Souvenir' — red with copper tinting.
- *'Sungod' — bright red.

* = varieties new in the York Street Unit in 1964.

- *'Surprise' — vermilion red with blue-black basal spots.
- 'Whirlwind' — red-orange.

Pink

- 'Adorable' — light pink, double, inner petals are narrow with black spear-shaped basal spots.
- *'Aksarben' — rose-pink.
- 'Betty Ann' — pink.
- 'Cheerio' — shell pink with cherry-red basal spots.
- *'Curlilocks' — deep rose-pink, fringed petals.
- 'Curtis Giant Salmon Pink' — salmon-pink.
- 'Eureka' — pink.
- 'Glowing Rose' — deep rose-pink.
- *'Helen Elizabeth' — pink.

Bicolor

- 'China Boy' — orange, entire center of bloom is white.
- 'Juliet' — actually a blend, outer edge of petal is a deep pink which gradually shades down to pure white at base of flower.
- 'Lucky' — white flowers edged with narrow border of orange.
- *'Maidens Blush' — white ruffled flowers with 1-inch wide blush pink edge.
- 'Pinnacle' — white flowers edged with red-orange.



Capsule of the Oriental poppy.

'Show Girl' — blooms are pink with large white centers, crinkled and ruffled petals.

'Springtime' — white trimmed in pink.

Iceland Poppy

The Iceland poppy (*Papaver nudicaule*), Colorado's only "true" native poppy, is found growing at elevations of 10,000 to 14,000 feet. A perennial, it is distinguished by producing flowers, 1 to 3 inches across, on leafless stems (scapes). It is available in a number of horticultural varieties in colors ranging from white through pink, scarlet and orange.

Iceland poppies are easily started from seed sown in the late fall or early spring or plants may be purchased from local nurseries. The seed may be planted in cold frames or directly into permanent beds. Seedlings may be transplanted from frames to permanent sites although it is best to sow the seed directly into their permanent locations. Plants from seed will bloom the first summer.

Shirley Poppy

The Shirley poppies, a race of *Papaver rhoeas*, are extremely variable annuals. Slender branching, they come in a variety of colors ranging from white through the pinks and reds. A number of double-flowering varieties are also available.

Seeds of the Shirley poppies can be sown in the late fall (October or November) or early spring (March or April). Several seedlings should be made in order to insure color throughout the summer. The seedlings should be thinned to 6 to 8 inches apart. Cap-

sules of the Shirley poppies, if allowed to mature, will produce viable seeds which will germinate the following year. Plants are available from local nurseries for those people who do not care to go to the trouble of growing them from seed.

California Poppy

The California poppy (*Eschscholzia californica*) is a perennial in its native California but is cultivated as an annual in Colorado. It can be started from plants or the seeds can be sown in the late fall or early spring directly into permanent beds. Upon germination, the seedlings should be thinned to 6 inches apart.

The California poppy is available in single or double-flowering varieties in shades of gold, lemon, pink and scarlet. The silver gray, finely dissected foliage is another interesting characteristic of this 8 to 12-inch plant.

Prickly Poppy

The prickly poppy (*Argemone intermedia*) is also a native of Colorado. A perennial, it is recognized by its spiny toothed leaves, yellow sap and large, 2-inch flowers. It is cultivated for its thistle-like foliage and large, white flowers.

Prickly poppies are started from seed collected from wild plants. Seed should be sown in October or April directly into permanent beds and later thinned to 12 inches. This species is extremely drought resistant and can be planted in the full sun in almost any kind of soil (especially the light sandy types).

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Denver Rose Show to Feature English Exhibition Box

DABNEY OTIS COLLINS

WOULD YOU LIKE to get a thrip's eye view of a show rose — to examine the entry from the top, as well as from the sides? Recently, an English rosarian had the idea that many people would like to do just this. So he invented what is known in rose shows as the "English Exhibition Box". This unique method of looking into the very heart of the rose has added a new dimension of enjoyment to the "Queen of Flowers".

The wood box is 14 inches long and 11 inches wide. The slanting top, 5 inches high in front and 7 inches high in back, is painted black. In the top are six small holes. Into these holes are inserted glass tubes holding the shortened stems of the exhibition roses. Only the blooms are shown, no foliage. Blooms are at their best when $\frac{3}{4}$ open.

The six roses shown may be of all different varieties. Or they may be two each of three different varieties. In last year's American Rose Society's national shows the English box exhibit attracted constant attention.

This new, highly interesting method of exhibiting roses will be featured, for the first time in the western United States, at the 16th Annual Denver Rose Show. Date of the show is June 21. It will be held in the spacious lobby of the First National Bank of Denver.

Another innovation is that this year's show will be open to any member of a rose society in the Rocky Mountain District of the American Rose Society who is also a member of the American Rose Society. Societies included are the Boulder Valley Rose Society, Longmont Rose Society, Arapahoe County Rose Society, Colorado Springs Rose Society and Utah Rose Society. Qualified exhibitors from these rose societies are eligible to compete for all prizes except those reserved exclusively for Denver Rose Society members.



English Exhibition Box entries at American Rose Show, Nashville, Tennessee, October, 1963.

Because of the increasing interest in rose arrangements, special attention will be given this part of the show. The theme, "Roses for the Home", should appeal to almost everyone. Classes will be divided into arrangements for the dining room, cocktail table, mantel, hall, bedroom and patio. Every part of the home will have a variety of displays of living beauty. There will also be many displays of dainty miniature roses.

"We are planning on having a thousand entries, not including arrangements," said Show Chairman Ray

Turnure. "And I would like to stress that this will be a show for education as well as a magnificent presentation of beautiful roses. Our members will be on hand to answer questions about the various types and varieties of roses on display and to tell you how best to raise roses in our high, dry, sunny climate. Helpful information will also be available on the making of arrangements."

Everyone is invited to attend the Denver Rose Show in the First National Bank, Sunday, June 21. It's fun — and it's free.



LEE CHAMBERS

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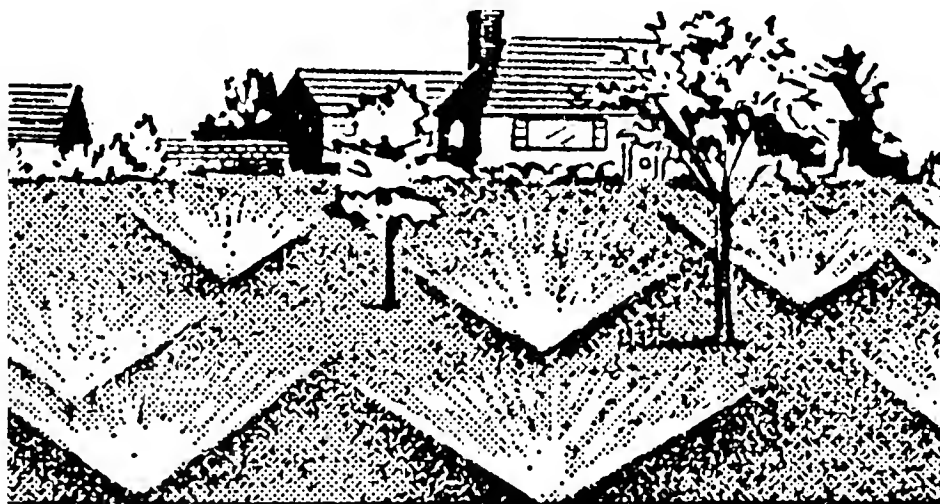
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1963 INTERNATIONAL

Holland Bulb Selections

NETHERLANDS FLOWER-BULB INSTITUTE

THE 1963 International Holland Bulb Selections have been announced by the Netherlands Flower-bulb Institute. The selection is made by an international jury of bulb experts and specialists on the basis of a poll of spring visitors made at the world's largest bulb garden, the Keukenhof, at Lisse in Holland.

The 1963 selections of the "most admired varieties" include nine tulips, one hyacinth and one daffodil.

TULIPS:

<i>Tulipa kaufmanniana</i> :	'Stresa'
<i>Tulipa greigii</i> :	'Red Riding Hood'
Triumph Tulip:	'First Lady'
Darwin Hybrid Tulip:	'Holland's Glory'
Darwin Tulip:	'Paul Richter'
Double Late Tulip:	'Nizza'
Lily-Flowering Tulip:	'Mariette'
Cottage Tulip:	'Rosy Wings'
Parrot Tulip:	'Texas Gold'

HYACINTH:

'Delft Blue'

DAFFODIL:

'Unsurpassable'

Following is a brief description of the 1963 selections:

'Stresa' has a yellow inside and red outside. This type of marking is characteristic of the Kaufmanniana class of species tulips to which 'Stresa' belongs. They are still growing wild in Turk-estan and closely resemble water lilies, so that they are sometimes called "water lily tulips".

'Red Riding Hood', an enormous hybrid of the Greigii class, is vividly colored in scarlet with black base and an exterior of carmine-red.

'First Lady' is greatly admired for its lovely colors of reddish-violet and



Tulipa kaufmanniana 'Stresa'

flushed purple. As a Triumph class tulip, it is especially adaptable for indoor growing in pots as well as for use in garden beds.

'Holland's Glory' is a very large orange-scarlet flower with a black base. Tulips in the Darwin Hybrid class, to which it belongs, result from crossing

Darwins with Fosteriana tulips. This class is noted for its huge flowers, generally red, on strong stems. 'Holland's Glory' is an outstanding example of the Darwin Hybrid class.

'Paul Richter' is a Darwin tulip of bright scarlet-red. Darwins, which bloom late in the spring, are the largest tulips, having blossoms as wide as they



'Nizza' tulip, Double Late class

are deep. 'Paul Richter' is a favorite of florists for indoor forcing.

'Nizza' is an intermix of yellow and red and like others in the Double Late class, it has a round, full peony-like appearance. These tulips are becoming more popular but are still unusual enough to stand out in the average garden, where they fit well into bed and border plantings.

'Mariette' has received three awards. This flower is a deep satin-rose and is in the Lily-Flowering class of tulips. This class of tulip is known for producing exceptionally graceful flowers and resulted from a cross between the Darwin and Cottage tulips.

'Rosy Wings' is a radiant pink flower with a white base. It was unveiled in 1944 as a welcome addition to the Cottage class. These tulips are a curious group — some have long stems, others short; some have pointed cups, like 'Rosy Wings'; and others have square cups.

'Texas Gold' as the name implies, is big and golden. It has a narrow red edge and the fringed petals of the Parrot class. The strange, exotic shapes and colors of the Parrot tulips makes them a conversation piece in any garden, particularly when planted in groups of a dozen or more as patches in garden borders. The Dutch have been fascinated by these flowers ever since



'Delft Blue' hyacinth

they were first discovered and described in Holland in 1665.

'Delft Blue' is one of the earliest hyacinths, especially for outdoor blooming. It is a good garden hyacinth and unsurpassed for pot and bowl culture indoors. The unusually large, well-filled spike is evenly formed and held above



'Unsurpassable' daffodil

the leaves. Flower bells are delicate and set close together — mauve-blue inside and lighter in the center. The bells, on their outer surfaces, are soft Prussian-blue to a beautiful porcelain-blue shade.

'Unsurpassable' lives up to its name, as a yellow trumpet daffodil. One of the largest daffodils yet produced, its grand trumpet is flanged and serrated at the mouth. A strikingly brilliant flower of fine substance, with blooms of enormous size, 'Unsurpassable' combines extraordinary depth and brilliant intensity of deepest gold color.

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EXOTICS of Colorado ... THE IRIS

HELEN MARSH ZEINER

ALTHOUGH COLORADO has a lovely native iris, *Iris missouriensis*, our common garden irises are all exotics.

The beauty of native iris species, wherever found, is such that it is easy to see why they found their way into early gardens. Here they were improved and hybridized until today there are hundreds of varieties available.

The genus *Iris* is of wide distribution, but it is generally a genus of the north temperate zone. There is great variability in the numerous native species, and consequently great variability

in the cultivated irises which were derived from these stocks.

Because there are so many different kinds of irises, they are usually divided into groups. Bailey's *Cyclopedia of Horticulture* lists 6 groups: German irises, Japanese irises, tall apogon irises (Siberian irises), dwarf irises, oncocylus irises and bulbous irises. Cultivated irises belonging to these groups have been developed over a long period of time from some native form or forms to be found in various parts of the world.

Probably the best known and most widely grown irises are the German or tall bearded irises. The many species of bearded irises are true exotics, being developed from species found in central and southern Europe and the eastern Mediterranean countries. These irises have been grown for many, many years. They are pictured and described in the early herbals. Some early writers referred to them as rainbow flowers, and the name *Iris* is from the Greek, referring to rainbow.

The exact origin of many bearded irises is lost in antiquity. *Iris german-*





ica is the type of the class, but it is not known to occur in a native state and many botanists believe it to be a hybrid. Many older varieties in lavender colors were developed from *Iris pallida*, while others in shades of yellow were developed from *Iris variegata*. *Iris florentina* was used in Mohammedan cemeteries and was distributed around the Mediterranean region by the Mohammedans. It became an ancestor of some modern forms.

Ancestors of our dwarf bearded irises ranged from southern France through northern Italy.

Japanese irises appear to be developed from one species, *Iris laevigata*. Manchuria is its probable origin.

Siberian irises were developed from forms native to central Europe and Russia.

Bulbous forms such as *Iris reticulata* came from the eastern Mediterranean countries. Bulbous forms such as the Dutch and English bulbous irises came from stocks native in Spain, Portugal and North Africa.

The oncocyclis irises are from central and eastern Asia Minor, Syria and Persia. They are seldom used in the United States.

Garden irises have traveled far from their sources of origin. The very ease with which the rhizome can be transported is a part of the reason for this. No doubt the iris came to America with the early settlers. As our country expanded, it was easy to carry along a few iris rhizomes, most of which were very adaptable to new habitats.

Hybridizers have been at work almost from the time that irises first appeared in a garden. The very uncertainty of the parentage of some irises shows how long the process of improving them has been going on.

Today, iris hybridizers are very actively at work seeking new colors, better form, hardiness and in general improving the plant. To know how well they are succeeding, you have but to think back to the "flags" of grandmother's garden!

While many hybridizers are working seriously with definite aims in mind, others are amateurs who are hybridizing irises as a hobby. For the interested gardener, hybridizing irises is not difficult and some of the results are very worth-while.

Interesting accounts of the history of irises are to be found in *Garden Irises*



by Randolph and *Rainbow Fragments* by Shull. Both of these books are available in the Helen Fowler Library. Randolph has an especially good discussion of hybridizers.

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The Status Of **HORTICULTURE** *In Colorado*

CHARLES M. DRAGE
Extension Horticulturist

THE LACK OF organized activity to advance education and standards in ornamental horticulture in Colorado is a real problem. There are a number of educational and professional organizations in Colorado that have worthy programs resulting in activities and accomplishments of material benefit to the state. Membership in these organizations varies from a few in some plant societies to more than 3,000 in the Colorado State Federation of Garden Clubs, Inc.

Starting a few more than 20 years ago, we have observed several instances where more than one group have combined their leadership and informed membership for total achievement. We have seen a small committee grow into a Colorado Forestry and Horticultural Association, with a Horticulture House and then the development of the growing complex known as Denver Botanic Gardens which will continue to expand in scope, activities and services. We have noted progress in the area of state parks and even greater progress in the development of roadside parks. It appears that more emphasis will be placed on roadside park development in the near future.

Yes, a great deal has been accomplished and we will continue to move forward.

Now, let's look at the failures, near failures and progress desired. Leaders in the turfgrass field, through their organizations, The Rocky Mountain Turfgrass Association and the Colorado Golf Course Superintendent's Association have, for several years, sought funds from the State Legislature to provide for research to supply the answers to costly problems common to the area. The Colorado Nurserymen's Association and the Colorado Arborists' Association have asked for research in the field of ornamental plant maintenance and culture. Research in the area of ornamental plants in Colorado is practically nil at the present time. A handful of unselfish leaders has spent many hours and much money to give Colorado a State Garden Show. With the best of management, the Show has not paid out financially; it has not had the active support, even by attendance, of many who profess an interest in horticulture.

The Colorado State Federation of Garden Clubs, Inc., sponsored billboard legislation in a recent legis-

lative session. A committee worked hard; much time was spent but legislative action was unfavorable. It is doubtful if the Federation had the active support of more than a small percentage of its entire membership.

Why have the numerous attempts on the part of horticultural groups to improve education and standards of horticulture in Colorado failed? Without strong organization they have faced strong, organized opposition.

Clarence Gillett, Chairman, Estes Park North End District Planning Commission, in a letter to the editor of the *Fort Collins Coloradoan*, published Sunday, October 27, 1963, wrote, "On Thursday, October 17, I attended a public hearing before the County Commissioners of Larimer County, held at the County Courthouse in Fort Collins, on the proposed County Zoning Ordinance for Larimer County. The feature of this hearing was the appearance of a battery of attorneys representing some of the principal advertising companies of the state. Each of them went on record, for his respective company, as being

opposed to the adoption of the County Zoning Ordinance."

What are other states doing? Kentucky was the first state to qualify for the Billboard Regulation Bonus and on July 8, 1963, Kentucky's Governor Coombs received a check for \$65,488. It is expected that Kentucky will receive about \$3 million in bonuses by the time the 700 miles of interstate highways are completed in that state. Thus far, 20 states have taken advantage of the law. States have two more years to qualify for the special bonus for controlling billboards along interstate highways.

Several conclusions can be drawn from past experiences. It is evident that key leaders do not recognize the importance of horticulture to the state. It is further evident that horticultural forces in Colorado are not organized to work together effectively and that no one leader or small group has assumed the responsibility of doing something about the total situation. Consultation has indicated that it would be possible to organize an effective program to advance horticultural education and standards.



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The bristle cone pine is a native of Colorado's high mountains. Growing at elevations of 7,000 to 13,000 feet, it is truly the monarch of the peaks. It seldom exceeds heights of 15 to 20 feet in its native sub-alpine environment and often takes on the habit of a prostrate shrub.

As a cultivated tree, the bristle cone pine is unexcelled in many ways. It grows well at all elevations from sea level to 13,000 feet. Temperature is not a limiting factor as it will withstand from minus 50 degrees F. to plus 100 degrees F. It does well under conditions of low humidity (2 or 3%) or the high humidity encountered in coastal areas. Soil is not a problem, as it will grow well in a wide range of soil types. When planting the bristle cone pine be sure and give it plenty of room.



Bristle cone pines growing on Mt. Goliath

Select a site where it will receive lots of sunshine and air. Shady and wet locations should be avoided.

The bristle cone pine is a slow grower. In the nursery, it takes seven years or more for it to reach a height of 2 feet. However, it does form a remarkably good root system and transplants quite easily. By selective pruning, it

can be shaped into a slender, pyramidal form. If topped back when young, it will spread laterally somewhat like a creeping juniper.

The needles of the bristle cone pine, which are in bundles of five, are 1 to 2 inches long. They are dark green in color and almost completely clothe the branchlets. Often, the foliage is speckled with a frost-like, resinous exudate.

With all these good qualities it is unusual that the bristle cone pine is not more frequently planted. Available at

most of our local nurseries, it is possible that it will become more widely used and popular in the future.

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IRIS Time at Denver Botanic Gardens

EVERETT C. LONG

IT'S "IRIS TIME" again at Denver Botanic Gardens with a cascade of color ranging through the spectrum from deep reds to ultra violets. Once more area residents can see and admire the gay, glamorous creations of the world's leading iris hybridizers.

Most of the 700 guest irises sent from all over the world for display at last year's national meeting of the American Iris Society remain in the Botanic Gardens for further enjoyment this year. These plants were originally sent on a loan basis, to be returned after



Blue Mountain, an Oregon origination by Schreiners' Gardens,
growing in Denver Botanic Gardens.

the 1963 convention. Through the generosity of the hybridizers, where stocks permitted, many of the clumps

were given to the Botanic Gardens completely. On others a division or two was allowed to remain. This action

explains the disparity visitors this year will note in the guest beds where one small plant will be growing next to large, lush clumps.

Iris growth is exceptionally responsive to temperature changes. The writer has observed bloom stalks stretching up over 2 inches in 24 hours during warm weather. A field with nothing but foliage will show buds popping up all over in a few hot days. Conversely, cool, cloudy days will stall growth almost completely. At the time this article was written, indications were that the best blooms for the tall bearded irises would be the first week of June, if the weatherman cooperates. Dwarf varieties flower in late April and early May. Next in line come the intermediates. As the name implies, these are irises whose blooming time and stature are between dwarf and tall varieties of irises.

In addition to the guest beds, Denver Botanic Gardens have extensive display beds of named varieties and species. Pure aril species, those exotic flowers from the Holy Land, are to be found here as well as many hybrid originations derived from this parentage. The Randolph collection affords one the opportunity to see the ancestors of many of today's modern varieties.

One of the five National Test Gardens of the American Iris Society is located here, as is a Regional Test Garden where local hybridizers can submit their originations for view and critical appraisal by qualified judges.

Readers are reminded to visit the always popular Rainbow Iris Garden in the City Park Unit of Botanic Gardens. This is a mass planting of over 100 named varieties located northwest of the museum. Another reminder:

Rainbow Iris Garden in City Park.



Visit the York Street Unit later to see the Spuria varieties. These follow the tall bearded irises in bloom.

Helpful Hints

Best transplanting time for irises is from early July to mid-September. Plants set later may not become established sufficiently to cope with *Botrytis convoluta*, a fungus organism most active during winter months.

Irises should be located in a well-drained spot having sun at least half the day. Soil type is not critical as long as drainage is good. Moderate amounts of organic or commercial fertilizer added to the soil will help.

Irises in Colorado have few pests or diseases. Frequent light watering may cause a fungus leaf spot or scorch, an affliction characterized by dying back

of leaves and roots with the rhizome remaining firm. Both diseases may be minimized by more thorough watering at greater intervals so the ground has a chance to dry out some between. The iris borer is no problem here, the climate being not to his liking.

In transplanting it is well to trim back the leaves part way so the wind will not buffet and disturb the newly set rhizomes. On established plants leaves should not be trimmed back or cut off until late fall when growth has ceased. Trimming tops then aids in the spring clean-up but is not a requisite.

When planting named varieties, make a chart of your beds and file away. Plant markers seem to have a fascination for neighbors' children and pets. Correct labeling adds interest to any garden.



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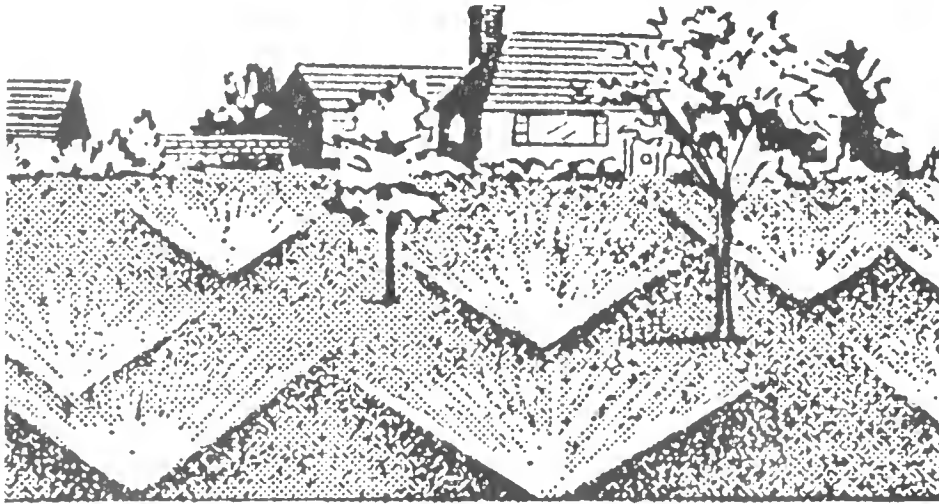
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No. 5



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THE COVER

Marsh-marigold (*Caltha leptosepala*)
Photograph courtesy of Mr. C. Earl Davis.

1964

Terrace and Garden Tours

Wednesday, July 22nd

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The Garden of Mr. and Mrs. Walter K. Koch, 370 Ash — has the charm of a Williamsburg or Georgetown garden with wrought iron gates and fences, paved brick areas, filtered sunlight through large old trees and a fountain area. The slope of the rear garden is interestingly treated with sandstone terrace walls. Birds are made particularly at home in this garden. Maintained entirely by the owner.

The Garden of Mr. and Mrs. Jack Bernstone, 265 South Cherry — is a contemporary garden reflecting the artistry of a modern painting. The plantings are a color harmony of all yellow and white against a backdrop of trees, evergreens and shrubs of wide variety of form and texture. Bronze accents of contemporary art reflect the handsome decor of the house interior.

The Gardens of Mr. and Mrs. Brown Cannon, 575 South Elizabeth — have wide expanses of grass bordered with a variety of evergreens, groves of weeping birch, Russian olive, red maples

and red-leaf plums beneath which are beds featuring perennials and a riot of colorful annuals — petunia, verbena, ageratum, lobelia, zinnia and snapdragon. Rose gardens of grandiflora and floribunda roses and a rock garden are at the entrance of the house, which is nestled amidst the spacious garden completely surrounding it.

The Gardens of Mrs. Lawrence Cowle Phipps, 3400 Belcaro Drive — are replicas of a prize-winning design at the Chicago World's Fair. Extensive areas of forest-sized trees, mature evergreens and intricate perennial borders were planted in the 1920's when the gardens were designed. The South Garden features varying ground levels and wall heights to give the illusion of distance and elevation. In the North Garden an elongated perennial border leads to a fascinating walled garden on the right and to the tennis house below.

The Garden of Mr. and Mrs. William D. Hewitt, 7 Cherry Hills Drive — though only two years old, has large evergreens and shade trees and a vari-

ety of gay annuals. Two patios, each opening from the family room, offer different views — one toward the children's play yard, featuring a strawberry barrel, the other toward the rose garden of massive stones, reached by a tiny bridge over a small pool.

The Gardens of Mr. and Mrs. Kernan Weckbaugh, 9 Cherry Hills Drive — a formal terraced garden with a magnificent view of the Rockies. From an elevated patio, accented with formal evergreens, steps lead to a lower terrace with a fountain. To the north of the house a formal garden of magnificent perennials and annuals is viewed

from the patio. On the south, some distance from the residence, a summer house sits among the varying colors of the trees—maples, evergreens, prunus, weeping birch and Russian olives.

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THE JARDIM BOTANICO OF RIO DE JANEIRO

EVA LOUISE HYDE

THE FOUNDING of the Botanic Garden of Rio de Janeiro was the result of a great crisis in European history. Napoleon's invasion and conquest of many European nations aroused the fear of Portugal's king, Dom Joao VI, and led him to flee his country, taking his court to the Portuguese colony of Brazil. Rio de Janeiro thus became, for a period of 14 years, the seat of the Portuguese empire. This was in 1808.

One of the first acts of the monarch, after settling in Rio de Janeiro, was to create an Horto Real (Royal Orchard), whose purpose was stated to be that of acclimatization and culture of spices. At about this same period a frigate, *Princess of Brazil*, was wrecked off the coast of Goa, in India. The shipwrecked passengers were saved and reembarked on a brig, continuing their voyage to Brazil. Unfortunately this brig was captured by the French, then at war with Portugal, and the passengers were interned on the Isle of France, in the West Indies. On this island, some 40 years previously, two Frenchmen, Poivre and De Monouville, had started the Jardim Gabrielle, where plants of great economic value then flourished. One of the Portuguese prisoners, Luis de Abreu Viveiro e Silva, was a botanist of renown. He not only managed to escape, by bribing his guards, but carried with him, as he

continued his journey to Brazil, a large collection of seeds and slips of spice trees and other exotic plants from the Jardim Gabrielle. These he presented to Dom Joao VI.

Two years later, in 1810, Marechal Manuel Marques, who had conquered French Guiana, sent to the Royal Orchard another collection of exotic plants from that region. Then in 1812 still other collections arrived from Portuguese Macau, off the coast of China. Among the plants thus introduced into Brazil were: tea, avocado, cinnamon, nutmeg, lichee nut, cashew, sago palm, bread fruit, and the royal palm.

In 1817 Dom Joao VI decreed a change in the name of the garden from Royal Orchard to Royal Botanic Garden. As long as the Portuguese emperor continued in Rio de Janeiro the Garden was his exclusive property. After independence was declared by his son, Dom Pedro I, in 1822, it was opened to the public, all visitors, however, having to be accompanied by a military guard. From this Botanic Garden, over the years, many exotic plants were scattered throughout Brazil, where they continue to flourish. Notable among these is the royal palm, that so-called "feather duster of the gods", which today adds charm to the public squares, as well as to aristocratic estates, all along the coast of Brazil.

One of the main activities of the

Garden, in its initial phase, was the cultivation and preparation of tea. This was under the direction of a Chinese, under contract for the purpose. Another was the culture of the bombanaca palm, whose leaves were employed in the manufacture of "Chilean hats", similar to what we know as "Panamas".

With the appointment in 1824 of Friar Leandro de Sacramento as director, the Garden progressed from a simple place for the acclimatization and culture of plants to that of an institute of botanical research. Friar Leandro was a Carmelite monk and a member of the Academies of Science of London and of Munich. He was brought to Brazil to occupy the chair of botany at the Medical School of Rio de Janeiro.

Some years later, after Brazil became a republic in 1889, J. Barbosa Rodrigues, a distinguished Brazilian scientist, who had created and directed the famous Amazonian Museum, in the north, became director of the Botanic Garden. Under his management, the Garden enjoyed a long period of development. Its collections were augmented, an herbarium and library started, and much attention paid to artistic landscaping. It was under Barbosa's direction that the Botanic Garden became "the most beautiful botanic garden in the world."

The area occupied by the Garden is very large. In 1947 there were more than 5,000 species of trees, duly classified and labeled, giving the genus, species, place of origin, common name (if any) and utility. Besides these, there are many thousands of ornamental plants cultivated in greenhouses and special plots. These comprise about 187 botanic families and 1,526 genera. There is also now a botanic museum.

The common or vulgar names given by Brazilians to the plants in this



Frangipani (*Plumiera*).

Garden are often very expressive as well as picturesque. Here are a few examples: onion trees, duck's bill, monkey's hairbrush, monkey's puzzle, turkey wattle, rabbit tail, cockroach whiskers, toucan's tail, corkscrew and candle tree.

Many birds, butterflies and bees, as well as a half dozen or so mammals, find sanctuary in the Garden and add to its beauty and charm. Notable among the birds is the *sabia*, a thrush similar to our mockingbird in its melodious song, highly praised by Brazilian poets. "Minha terra tem palmeiras onde canta o *sabia*" ("My country has palm trees where the *sabia* sings"), so begins the "Song of the Exile", one of the best known and most often quoted poems.

On entering the Garden, one passes through a wide portal, flanked by guardhouses. From this gateway the gaze passes down a long and magnificent avenue of royal palms, reminding one of the nave of a great cathedral bordered by stately columns. A similar avenue parallels the entire front of the Garden, forming a "T" with the central leg approximately $\frac{3}{4}$ of a mile in length. Halfway down the central aisle, one comes upon a beautiful bronze fountain. Other bronze sculptures, notably busts of famous botanists of Europe

and Brazil, are found in various parts of the Garden.

Exploring the right hand side of the Garden, we soon come across the Amazon ecological section. Here, on a



Avenue of royal palms.

tiny island, we find a typical Amazon hut made of palm leaves. The figure of an Amazonian caboclo or peasant sits at the water's edge, fishing pole in hand. The lake surrounding the island is at times almost entirely covered with the huge pads of the *Victoria regia* (*V. amazonica*) whose diameter is often 3 feet or more. The flower is a lovely pink with many petals.

Continuing our excursion on this side, we may come across a group of seringueiras, rubber trees. The oblique gashes in their trunks show that they have often been tapped for the milky latex. Presently, if we are there at the

proper season, we shall see the ground beneath a group of jambo trees covered with silk, cerise colored stamens which have fallen from the blooming trees, forming an exquisite Oriental carpet. If it is spring, we shall see another tree group whose new foliage and blooms are of a beautiful pastel pink shading into a purplish red. The new leaves of these sapucaias remind us of autumnal tints in the U.S.A. though of a more delicate shade. The fruit of these trees is a large pod containing delicious nuts.

As we stroll along we occasionally get a whiff of something spicy. It may be cinnamon, cloves, nutmeg, or even camphor. Curious shapes in flowers and fruits intrigue the eye. There is the handsome breadfruit with its incised leaves and large round fruit. Nearby will be its cousin (both artocarpias), the jackfruit tree. The enormous watermelon-size fruit of this tree hangs by a short stout stem directly from the trunk and larger branches of the tree. Next a medium sized tree claims our attention because it looks as though a practical joker had decorated its branches with large white Spanish onions. It is called the woods onion tree (*Clusia grandiflora*). The wax candle tree (*Parmentiera cereifera*) with its upright taper-like fruits, looks as though awaiting a match to light up into a Christmas tree.

Here is a tree whose trunk and large branches look as if they had broken out in black measles. The black plum-sized fruits, which crowd each other on the trunk, make a delicious juicy mouthful. They are jaboticabas. When in bloom, a white fuzz covers the trunk and branches.

Now we pass near the largest tree in the park, a giant sumauma, whose umbrella-like crown shades its lesser comrades. This tree flares at its base, into great buttresses which, we are

told, serve as a medium of communication for the Indian tribes inhabiting the dense northern woods of Brazil. By striking one of these buttresses with a stout stick, a loud boom may be heard for a great distance. Like the African drums, the rapidity and number of booms conveys the message.

An avenue of graceful mulatto trees next captures our attention. Prior to July, the trunks of these trees present a beautiful bronze tone — hence the name mulatto. After this date the bark splits up and peels off, exposing a shiny green surface, which later regains its mulatto shade. Not far from the avenue of mulattoes, we spy a single, slender but very tall, palm, a plaque at its base bearing the date of planting by Dom Joao VI, 1808, and its name, palmeira mater, or mother palm. Nearby is the bronze bust of Dom Joao VI.

Everywhere in the Garden one finds palms of every size and shape of frond. Many of these are native of Brazil but a great many come from the far reaches of the earth. The same may be said for



Victoria regia.

bamboos which range from pencil-sized stems to the giant imperials, whose stems have a diameter of about 3 inches.

The Garden does not go in for flower beds, relying for color on its gorgeous flowering trees and vines. There is no month in the year without bloom somewhere. Among the loveliest of these blossoming trees are: kapoks, jacarandas, cassias, poncianas, and ipes.

This short description is entirely inadequate for a just appreciation of the richness and beauty of Rio de Janeiro's Jardim Bontanico. It must be seen to be believed.

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The History of

The Denver

Mountain Parks System

EDMUND WALLACE

DENVER'S famed and unique Mountain Parks System is a triumph of perseverance on the part of forward-looking municipal and civic leaders.

Embracing a wide variety of scenery—foothills, peak-to-plain views, canyons and open valleys, lakes, alpine meadows, creeks, woodland and wild flowered areas—the system is the delight of natives, adopted sons and daughters, and tourists. But the obstacles that had to be overcome in the establishment of such diversified rest and recreation facilities almost proved insurmountable to the “dreamers” of 40 years ago. Fortunately, those leaders refused to be overawed by the opposition and this generation is reaping the benefits of their farsightedness.

The chain of parks was first proposed by Mayor Robert W. Speer in an address May 24, 1909, at the 25th anniversary banquet of the Denver Chamber of Commerce. Less than a year later, on February 21, 1910, Mr. Speer again urged creation of the park system, together with a roadway up Mount Evans. This plea was made before a meeting of the Denver Young Women's Christian Association.

After Mayor Speer had planted the

seed, the city's business and industrial organizations assumed the responsibility for nurturing the plan to full growth. In early 1911, the Chamber of Commerce, Denver Real Estate Exchange and the Denver Motor Club, acting independently, began studies of possible mountain recreation areas.

These groups united to form the Mountain Parks Committee of the Commercial Bodies with but one purpose: To establish the mountain playground we enjoy today. The committee had no precedent to follow. The idea was unique and still is. Denver is the only municipality in the U.S.A. which has mountain parks it can call its own.

By dint of much hard work, the battle was won in 1912 and 1913 by convincing:

1. The people of Denver to approve a charter amendment authorizing the city to act.
2. The State Legislature to pass an enabling act.
3. Congress to make the land available.

The first money for the project, secured through a levy of ½ mill on all Denver property, became available in 1913.

One year later, an Act of Congress permitted Denver to purchase 7,047 acres of public land at a cost of \$1.25 an acre. The first great construction achievement was the completion, in 1913, of the famed "Lariat Trail" up Lookout Mountain. From then on for the next four years the parks and their system of roads expanded rapidly. Lookout Mountain was connected with Bergen Park and a highway snaked its way up Bear Creek Canyon to Evergreen. During this period the Mountain Parks Committee was officially in charge of the park development and continued active, unofficially, for many more years.

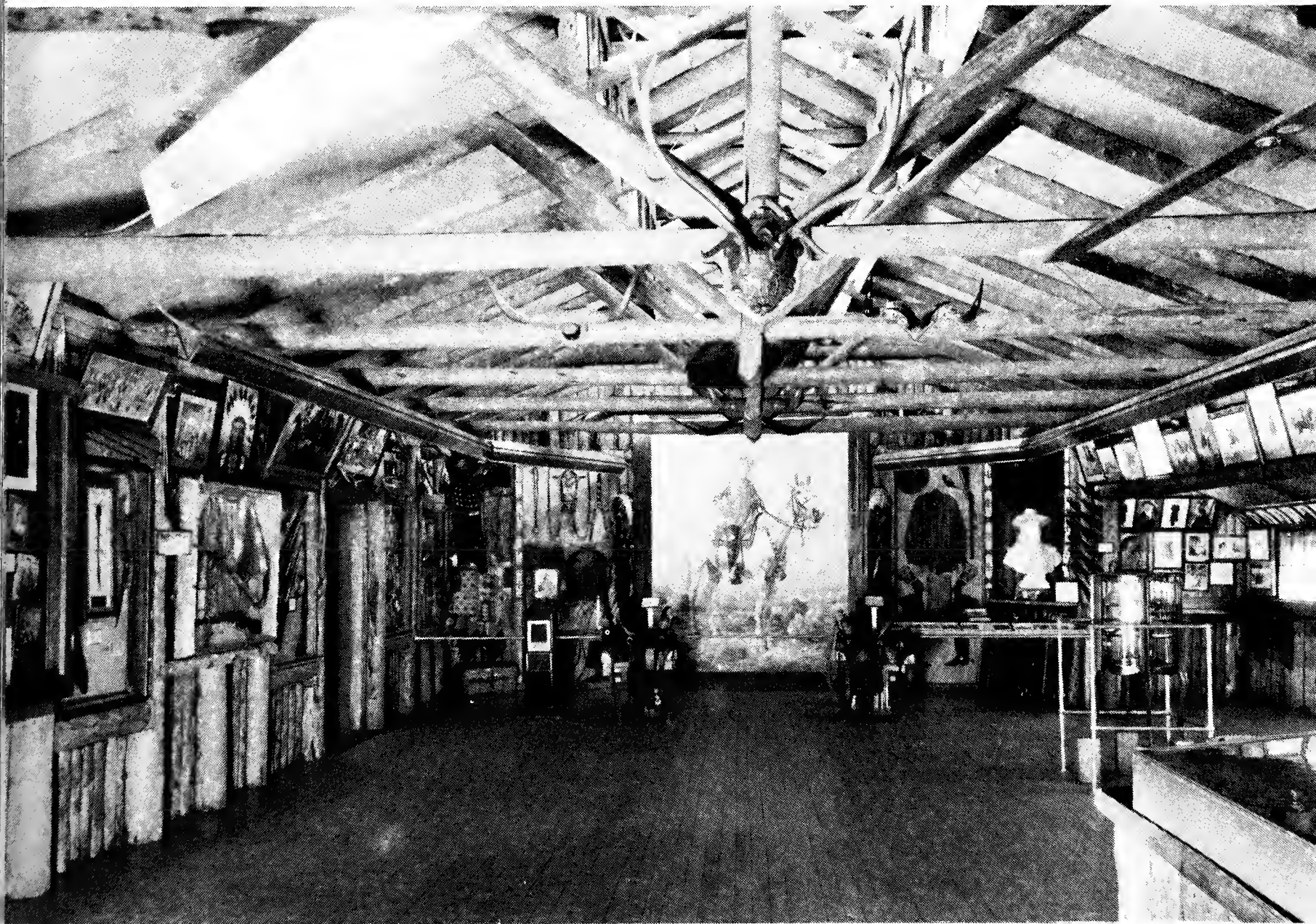
The Mountain Parks System is now a major responsibility of the Denver Department of Parks and Recreation and covers 13,448 acres, or 21 square

miles, scattered over an area of 380 square miles. The chain begins 15 miles west of Denver at an elevation of 5,681 feet and rises to Summit Lake, 12,740 feet above sea level and 60 miles west of the city.

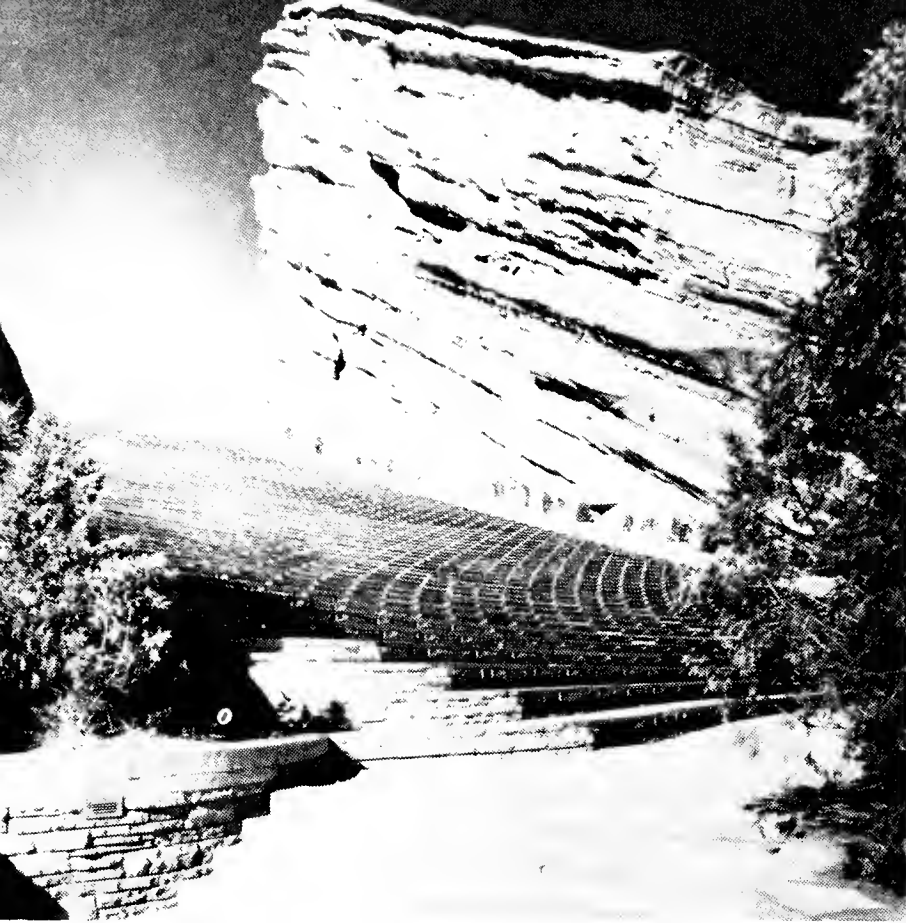
Included are 27 named parks, totaling 8,632 acres and ranging in size from a fraction of an acre to sprawling Genesee Mountain Park, which boasts an 8,274-foot peak in the middle of its 2,341 acres.

Twenty-four unnamed wilderness areas cover additional thousands of acres. Included in this territory are 20 mountain tops, forfeited by homesteaders and granted by the federal government to the city.

Nearly all of the named parks are accessible by these major highways — U.S. 6, U.S. 40, U.S. 285 and Colo-



Buffalo Bill's Museum.



The outdoor theater at Red Rocks Park.

rado 74. Using these routes interchangeably and in combination with interesting roads, the imaginative motorist can outline more than 50 one-day trips.

The park area is serviced by 76 miles of secondary roads maintained in the past and policed cooperatively by Jefferson, Clear Creek and Denver Counties, the State Highway Department and the U.S. Bureau of Public Roads.

Recreational facilities of the parks system are as varied as their surroundings. Play and picnic areas abound. Opportunities for hiking and rock climbing are unlimited. The angler can fish for mountain trout in season.

Buffalo and elk graze over 1,000 acres of fenced land at Daniels Park and in a 640-acre enclosure at Genesee Park.

Perhaps the most surprising feature to the sports minded tourist is the Denver Municipal Mountain Parks golf course at Evergreen. Amid rare and breathtaking scenery in the rarefied air of 7,000-foot elevation, the city maintains an 18-hole, sand-green course that offers an unusual challenge to the golfer.

Another magnetic tourist attraction, and one deeply appreciated by thou-

sands of Coloradans, is the spectacular Red Rocks Park and its magnificent open-air theater. Summer concerts under the stars, a famed Easter sunrise service and other attractions with wide crowd appeal make Red Rocks a mecca for those who appreciate the spectacular in natural surroundings.

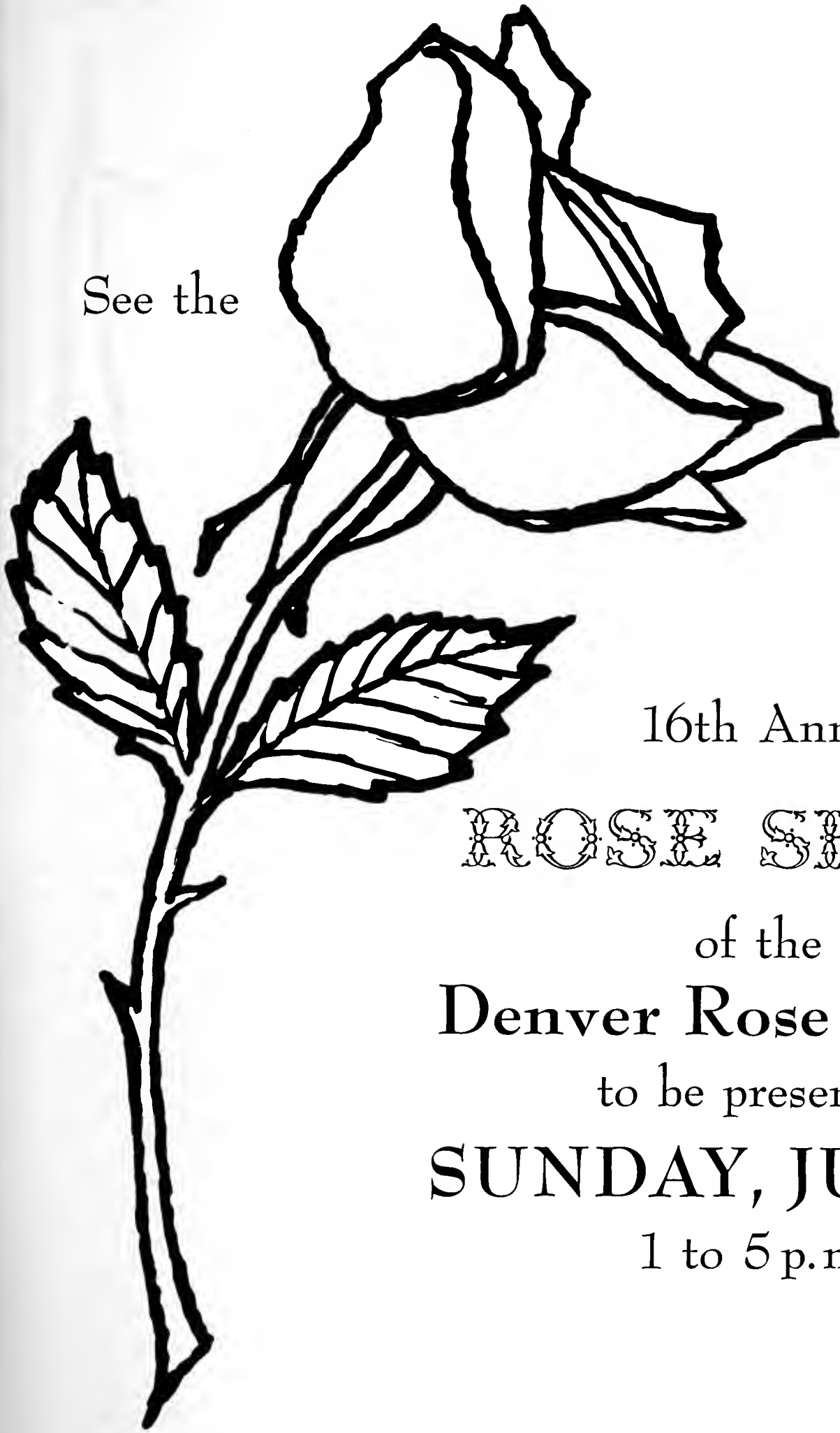
Other favorites are Buffalo Bill's grave on Lookout Mountain and Summit Lake, a beautiful way point on the drive to the top of Mountain Evans, the nation's highest motorway.

Denver and Colorado are truly blest with one of the world's rarest assets in the Mountain Parks System, which stands today as a monument to the ingenuity and foresight of the city's pre-World War I citizens. By the same token, the well-cared-for parks reflect a genuine appreciation of those early-day efforts by present and past city officials who have carefully nurtured and brought to fulfillment the dream of the trail blazers.



Denver Mountain Parks are noted for their scenic beauty.

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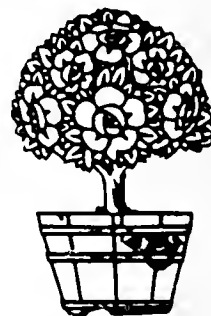
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The Alpine-Subalpine Trails of MOUNT GOLIATH

E. H. BRUNQUIST

I. Major Features and Values

"MT. GOLIATH" has come to stand for more than the name of a lesser peak of the Mt. Evans complex west of Denver, and this is chiefly because of the M. Walter Pesman Trail which was established jointly by the United States Forest Service and the Denver Botanic Gardens.

This is the first of several articles with a three-fold purpose: (a) To describe what the trail has to offer to gardeners and to people who are interested in plant life but know very little about it; (b) to present a rough-and-ready, non-technical classification of the major kinds of plants of the region, again with the general public in mind; and (c) to provide amateur botanists with an in-progress checklist of the flowering plants (exclusive of the grasses and sedges), together with whatever simple criteria may be available for aid in their identification. Many people have been concerned in the field-work or in the task of determining the names of species; we need a continuation of that cooperation.

Mt. Goliath is reached by a paved road, the only road between Echo Lake and Mt. Evans. The lower end of the

trail starts from a roadside parking area which is almost exactly 3 highway miles from Echo Lake Lodge. The upper end of this trail also begins at a parking strip, this one being almost exactly 5 miles from the Lodge. There is a large U. S. Forest Service sign at each end of the main trail; the upper end of the trail is at an elevation of about 12,100 feet and the lower end at about 11,500 feet. The highest point of the drawn-out summit of Mt. Goliath is about 12,200 feet.

There are two trails: a shorter loop trail (about $\frac{3}{4}$ of a mile long) and the main trail (about 2 miles in length). The loop trail starts at the upper parking lot; it is entirely above timber line, and therefore entirely in the Alpine Zone. The left side of the narrow loop (that is, to the left as the walker faces north) is not far from the highway, and parallels it to some extent. The trail finally loops backward and returns to the parking area, this side of the loop being closer to the boulders and cliff which form a rampart to the east of the loop trail, and between it and the start of the main trail.

Any vegetated area of the Alpine Zone in the western hemisphere is com-

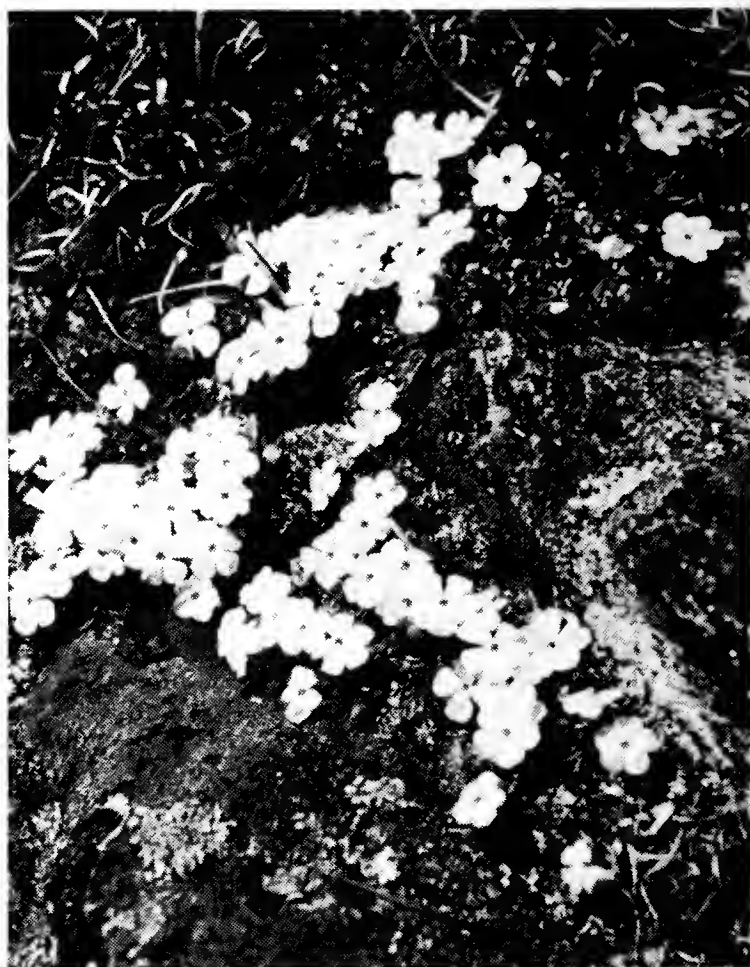
monly referred to, by Americans, as the *tundra*, and thus the plants of the loop trail are all tundra plants, although some of its species also occur in lower plant zones.

The upper terminus of the main trail is also at the upper parking lot, and from here it winds downward by easy grades to pass through timber line (which here is at an altitude of about 11,700 feet above the sea) and to finally end at the lower parking lot. The main trail affords a generous representation of plants common to the two upper plant zones, alpine and subalpine.

An elevation of 10,000 feet is the conventional lower limit of the Subalpine Zone in this portion of Colorado, and the highway (#68) between Squaw Pass and Echo Lake reaches this elevation at a roadway distance of about 1 mile northwest of the Pass. In the drive of about two hours from Denver, one starts from the upper limit of the Plains Zone and sees plant life of all five of Colorado's vegetation zones by the time he reaches the Mt. Goliath upper parking lot.

Potential Appeal of the Trails

Certain facts and points of view of a general nature may contribute much to the enjoyment of a visit to Mt. Goliath. Most people, and especially young ones, are potential naturalists to some degree, and quite capable of appreciating many of the generalizations and implications of biological and geological knowledge. Veteran naturalists have emphasized that considerable of what is seen on a walk has *significance* of one kind or another, and that it pays to be on the lookout for it. The dimension of time, too, may be brought into the perspective with profit. Certain of the items of the following examples of outstanding background facts will not be new to some readers of *The Green*



Phlox caespitosa

Thumb, but it is assumed that most people are glad to have such information reviewed for them now and then.

(a) It is unfortunate to go to the mountains — or to almost any natural area of the earth — without keeping in mind that in spite of the diversity of plants and animals, they are all kinfolk of a kind. There is good presumptive evidence that most if not all forms of life descended from single-celled, water-dwelling ancestors, perhaps from a single kind of organism. Take this selection: pond scum (algae), dinosaurs, the amoeba of dysentery, orchids, spiders, trees and men; they are partners in what may be called *Operation Life*. Furthermore, if we exclude viruses and the like, it may be said that we are partners in *Operation Protoplasm*, because our protoplasms are considerably alike in composition, in physical and chemical organization, and in such basic activities as respiration, excretion and heat production.

(b) Important, too, is the fact that although continuing change is evidently

the rule for individuals, for most kinds of organisms, for human society and for the physical world and universe, certain kinds of plants, such as algae and bacteria, have changed but little during hundreds of millions of years. You may recall that humankind has evidently been around for a mere couple of million years or less.

(c) Like humankind, practically all animal life and an abundance of plants (e.g., fungi and bacteria) are completely dependent, either directly or indirectly, upon the energy available in



Silene acaulis

food manufactured by the cells of green plants in cooperation with the energy in sunlight.

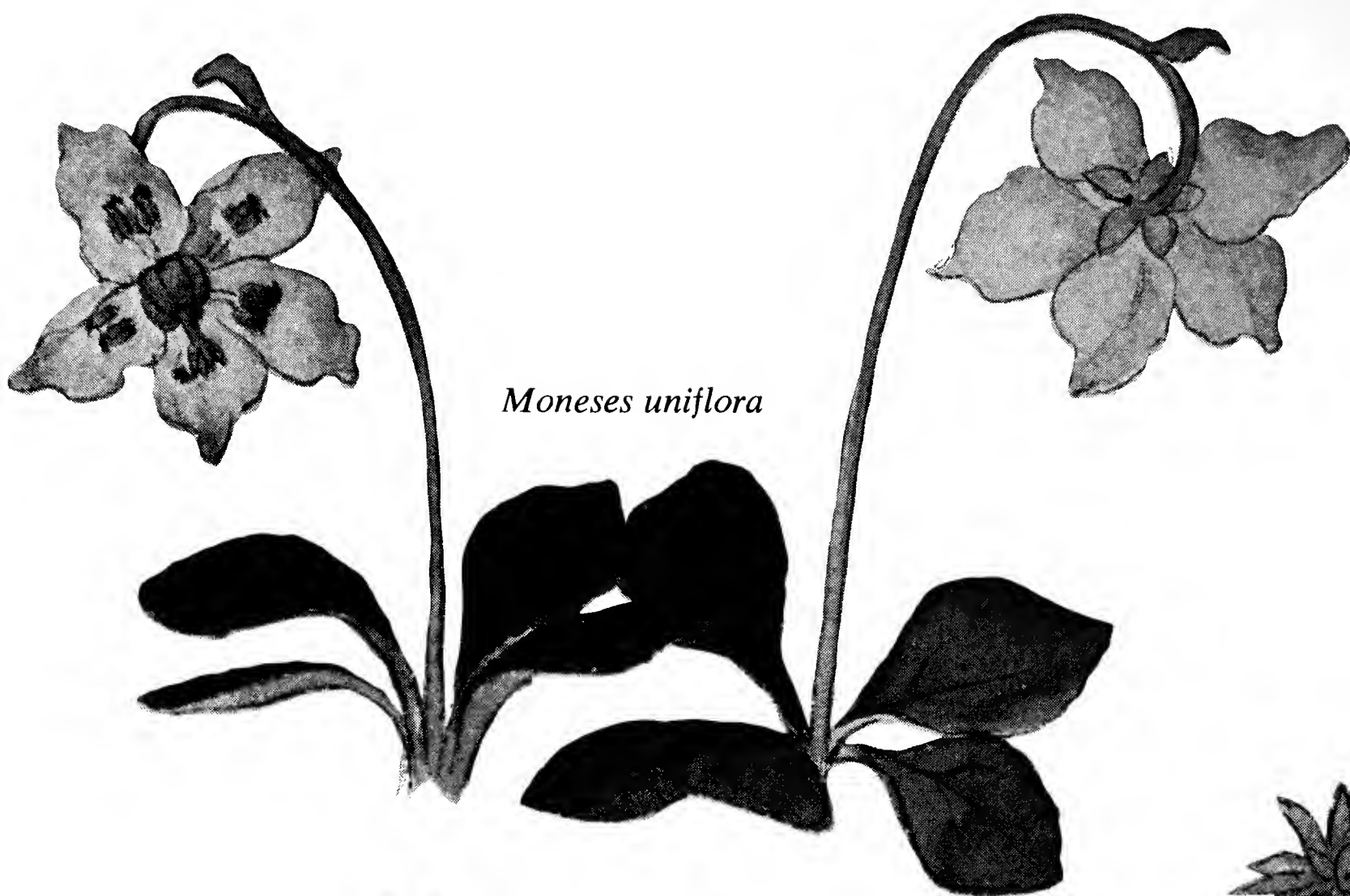
(d) Every plant is able to survive and thrive only in so far as it is able to adjust (adapt) to environmental stresses, and there are many different and interesting ways by which adaptation is achieved. In most places wild plants are subject to severe competition for living space and for nutrients, and species and individuals meet the challenge in an amazing variety of ways. Ask yourself how it comes about that

green algae often grow in visible masses on the bottom of a quartz rock (but not on other rocks), provided that the rock is of the proper size, and if it has been embedded in the ground for some time. The algae do not grow visibly on the top of the rocks.

Vegetation along the trails has potential appeal from a variety of standpoints. There are aspects of interest for the individual with only a casual interest in wild flowers; for gardeners curious about the wild, high-altitude relatives of their cultivated plants; for biologists interested in the extent to which plant and animal life can adapt to stresses of high-country climate and weather; and for amateur botanists for a variety of reasons.

Gardeners, whether they know it or not, are to a considerable degree plant *ecologists*, because they are routinely concerned with the *relationships* of their garden plants to *environmental conditions* such as soil, climate, weather, microorganisms, insects, dogs and even mowing machines. Experience has shown that people who have had little if any contact with botany in their education, are likely to be more interested in hearing about trials and tribulations of plants above timber line than in learning the names of the plants and details of identification.

A thorough-going investigation of the ecology of the Mt. Goliath region is much to be desired; a comparative ecological study of the Mt. Goliath, Summit Lake and Mt. Evans regions would be even better. Intensive research in the Niwot Ridge area (Boulder County), including both the Alpine and the Subalpine Zones, has been conducted by John W. Marr and his associates of the Institute of Arctic and Alpine Research (University of Colorado), and in the Trail Ridge region (Rocky Mountain National Park), by



Moneses uniflora




Saxifraga debilis



Lloydia serotina




Silene acaulis




Saxifraga chrysantha

A botanical illustration of *Saxifraga chrysantha* showing a slender, upright stem with several small, rounded, lobed leaves. The stem is covered in small, dark, pointed bracts. At the top, there is a single flower with five petals and a dark center.




Tonestus pygmaeus

A botanical illustration of *Tonestus pygmaeus* showing two separate plantlets. Each has a short, thick, fleshy stem with several narrow, lanceolate leaves. The leaves have a slightly wavy or undulating margin. At the top of each stem is a single flower with five petals and a dark center.



Aquilegia saximontana

A botanical illustration of *Aquilegia saximontana* showing a single plantlet with a long, slender, upright stem. The stem is covered in small, dark, pointed bracts. At the top, there is a single flower with five petals and a dark center.



Phlox caespitosa

A botanical illustration of *Phlox caespitosa* showing a dense, low-growing cluster of plants. The leaves are narrow, lanceolate, and have a slightly wavy margin. The flowers are five-petaled and have a dark center.

Bettie E. Willard *et al.* Some of the conclusions and generalizations yielded by these studies may be applied with caution to the Mt. Goliath region.

Stress Conditions on the Tundra

Plant groups (families and the like) and individual plants have survived and thrived throughout their history on earth only by adjusting (adapting) to a wide variety of stress conditions, ranging from hardships of climate and weather to competition among themselves. At this time we will limit ourselves principally to conditions above timber line, for here the ways by which success is achieved are dramatic and relatively obvious. The means by which adaptation is effected varies with the kind of plant, and even the expert ecologist sometimes has to guess or to admit that he does not know.

Competition among plants for living space and food is obviously severe for much of the earth, but it is claimed that above timber line such competition is likely to be less prominent than the struggle against hostile conditions of climate and weather. According to this concept, there is a sort of *communal involvement*, because of the fact that in some places at least, the community of vegetation maintains a more or less continuous mantle of plants and interlaced roots which is of vital importance for the welfare of the society as a whole. A break in the mantle invites deprivation by wind, running water and frost. It is said that many decades may pass before a rupture (breaks may be caused by such things as a gopher digging or by a person who dislodges a rock) of the mantle will heal. In this connection the reader is referred to the booklet, *Alpine Wildflowers of the Rocky Mt. National Park* by Bettie E. Willard and Chester O. Harris; it has considerable information about tundra ecology, as well as many wild flower

pictures in color; and is on sale at Botanic Gardens House, at 75 cents.

The adaptive capabilities of plants of the Alpine Zone is prominently challenged by high wind velocity, scarcity of water, low temperatures, extremes of temperature, and snow cover. An extensive consideration of these factors would be out of place in this article, which will limit itself to some of the major aspects.



Polygonum bistortoides.

WIND Plants may suffer from high wind in a number of ways: simply because of its velocity; because of the hail, sand or gravel which it may carry; because it is dry and evokes excessive evaporation of water from the leaves (transpiration); because it causes rapid evaporation of snow or of soil water; or because it may blow much of the Alpine Zone snow down into the Subalpine Zone.

TEMPERATURE Stress due to temperature conditions, particularly low temperatures, is particularly prominent in the life of tundra plants. During fall and early winter, in temperate and northern regions, plants undergo a *hardening* process. The protoplasm

undergoes physical and chemical changes (one of these is partial dehydration), which increases its tolerance to freezing temperatures. It is known that the needles of some pines are killed at 18 degrees F. above zero, but may withstand a temperature as low as 40 degrees F. below zero when they have been naturally hardened.

Plant physiologists report that freezing temperatures may kill plants either directly or indirectly. When death occurs from direct action it is the result of the formation of ice crystals, which are generally formed between, rather than within the cells. This ice formation tends to draw out water from the interior of the cells; the protoplasm becomes excessively dehydrated, and desiccation is the actual cause of death. Freezing temperatures may cause death indirectly by being responsible for one or more of the following: (a) Exhaustion of food reserves; (b) heaving of the soil by ice crystal formation (one effect of this is to uproot seedlings); (c) desiccation, which is commonly considered to be the most frequent cause of winter-killing under natural conditions. During the winter months and particularly in early spring, the rate of evaporation from leaves is high on clear windy days at a time when absorption of water by the roots is deficient, because the soil water is frozen.

There is no data for Mt. Goliath, but evidence obtained by Marr and his associates shows that there has been only about $\frac{1}{2}$ as many frost-free summer days in the Alpine Zone of the Niwot Ridge region in comparison with a nearby subalpine station (45 as compared to 87 days). For Alpine Zone regions of Colorado in general, the growing season is usually too short for some plant species to develop seed or even to blossom in the course of a single season.

SCARCITY OF WATER Several of the aspects of water deficiency were mentioned above in connection with wind and temperature stress. Plants are able to regulate the rate of evaporation from the leaves somewhat, but only within limits, and they suffer when such loss exceeds the amount of water absorbed by the roots. Soil water is not available to the plant if it is frozen, or if the water is too cold for the physiological process of absorption to occur. Mt. Goliath is



Trifolium nanum.

subject to frequent summer showers, but much of the water drains away with astonishing rapidity.

SNOW COVER So far as snow cover is concerned, studies of similar areas elsewhere in Colorado have shown that although blizzards are frequent and severe in winter, their contribution of moisture to much of the tundra is likely to be limited; much of the snow is blown down into the Subalpine Zone and the rest tends to collect in isolated drifts. Reports indicate that on Niwot Ridge there is usually a good plant cover in places where the snow lies all winter but melts early in the spring, but that where snow banks remain until

very late, a site may be completely devoid of higher plants and have merely a thin cover of mosses and lichens.

Adaptations to Above Timber Line Conditions

APPROPRIATION OF ROCK SURFACES for living space by lichens is a conspicuous example of adaptation, but one which is equally common in the other plant zones and very much around the world. It may have been the earliest and most important of plant adaptations to dry-land living when the land surface of the earth consisted principally of rock. From that time, and through hundreds of millions of years, lichens have evidently been of prime importance for soil formation. Root-like holdfasts of the fungal portion of the plant push into minute cracks, where the acid excretory products of the plant act to soften and decompose the rock. After small amounts of soil have accumulated from the work of lichens and the action of weather, mosses are able to gain a foothold and to step up the rate of soil formation. Many lichens are to be seen along the Mt. Goliath trails, and occasional moss as well.

MAT OR CUSHION PLANTS The mat or cushion habit of growth is a means by which some species of plants are adapted for tundra life. There are examples in both of the vegetation zones of Mt. Goliath, such as moss campion (it is not a moss, but pink!), alpine clover and sandwort. Such plants literally hug the ground, and may be less than an inch in height. The roots are usually rather long, and are tough and woody in some species, or stout and tap-rooted in nature in others. Specimens of certain of these species, collected elsewhere, have been judged to be several hundred years old. Long roots resist a flowing movement of the

soil (solifluction) which is prone to occur on slopes during the spring thaw. Marr and his associates found that in places where plants and soil are chronically exposed to severe desiccation, certain species of mat plants (e.g., moss campion, sandwort, and alpine forget-me-not) are particularly likely to be abundant.

THE SHELTER HABIT Some species are able to grow somewhat tall because they grow in the partial shelter of rock



Lloydia serotina.

overhangs or in the fissures of cliffs: alumroot (heuchera), big-rooted spring beauty, and alpine mountain-sorrel are examples. Musk root (genus *Adoxa*), a delicate and fragile looking species, with thin leaves and devoid of hairs, has been found far under the overhang of a large boulder near the upper parking area of the main trail. It is the only species of the family in the world.

HAIRINESS It has been questioned whether this is an adaptation to cold or an adaptation at all, but it is commonly believed that hairiness tends to minimize evaporation of water from the

plant and to minimize radiation of heat from it. Alpine gold flower (also called rydbergia) and woolly actinea, two densely hairy species, are found on the Mt. Goliath trails; both are members of the daisy family.

VEGETATIVE REPRODUCTION Because of the short growing season, many of the tundra plants propagate principally by vegetative reproduction, rather than by sexual reproduction (seed production).

Timber Line and the Upper Subalpine Region

To pass through timber line — especially on foot — is a memorable experience, for this transition place of dwarfed and wind-tortured woody plants is dramatic testimony to the fact that here is the altitude at which trees and most shrubs are obliged to give up the struggle to exist against a complex of hostile climate and weather conditions. It is of interest to note that the flowering plants able to tolerate above timber line stresses are principally herbs, and that these, like mankind, are relative newcomers who appeared on the world stage long after the conifers, who must give up the struggle at timber line. This is a good time to remind ourselves that plants and animals on the whole are still evolving, with some doubtless headed for extinction and the majority on the way to becoming progressively something different.

The strip of vegetation which is timber line, where the main trail of Mt. Goliath crosses, is so narrow that the walker may miss it if he isn't on the

alert and walks rapidly, for he suddenly finds himself among the bristle cone pines. Certainly the transition between alpine and subalpine is much more gradual on the main trail to Longs Peak or on some approaches to the summit of Mt. Evans.

We are fortunate in having a stand of bristle cone pine (*Pinus aristata*: also called foxtail or hickory pine) on Mt. Goliath, within the lower ½ mile of the main trail and within easy walking distance of the lower parking area. This species of pine is of special interest because it is now believed that certain specimens are the oldest living things of the earth. One of these trees in the Sierra Mountains, California, is about 4,150 years old. The oldest known giant redwood is about 3,200 years of age. Some of the dead trunks still stand firmly erect in the Mt. Goliath group, and although they have evidently been dead for decades, show little evidence of decay. Evidently the mean temperature here is too low to favor the rapid decomposition by bacteria and fungi which is the rule at lower altitudes, but temperature may not be the whole story. The dead trunks have been highly polished by wind-blown rain, sleet and sand, and exhibit a beautiful variety of pastel coloration. It is a rare experience to view this group of trees, living and dead, in full moonlight.

Plant geographer Polunin cites the fact that timber line throughout the world is to be found at the altitude where the mean temperature throughout the years is about 50 degrees F.

MEMBER



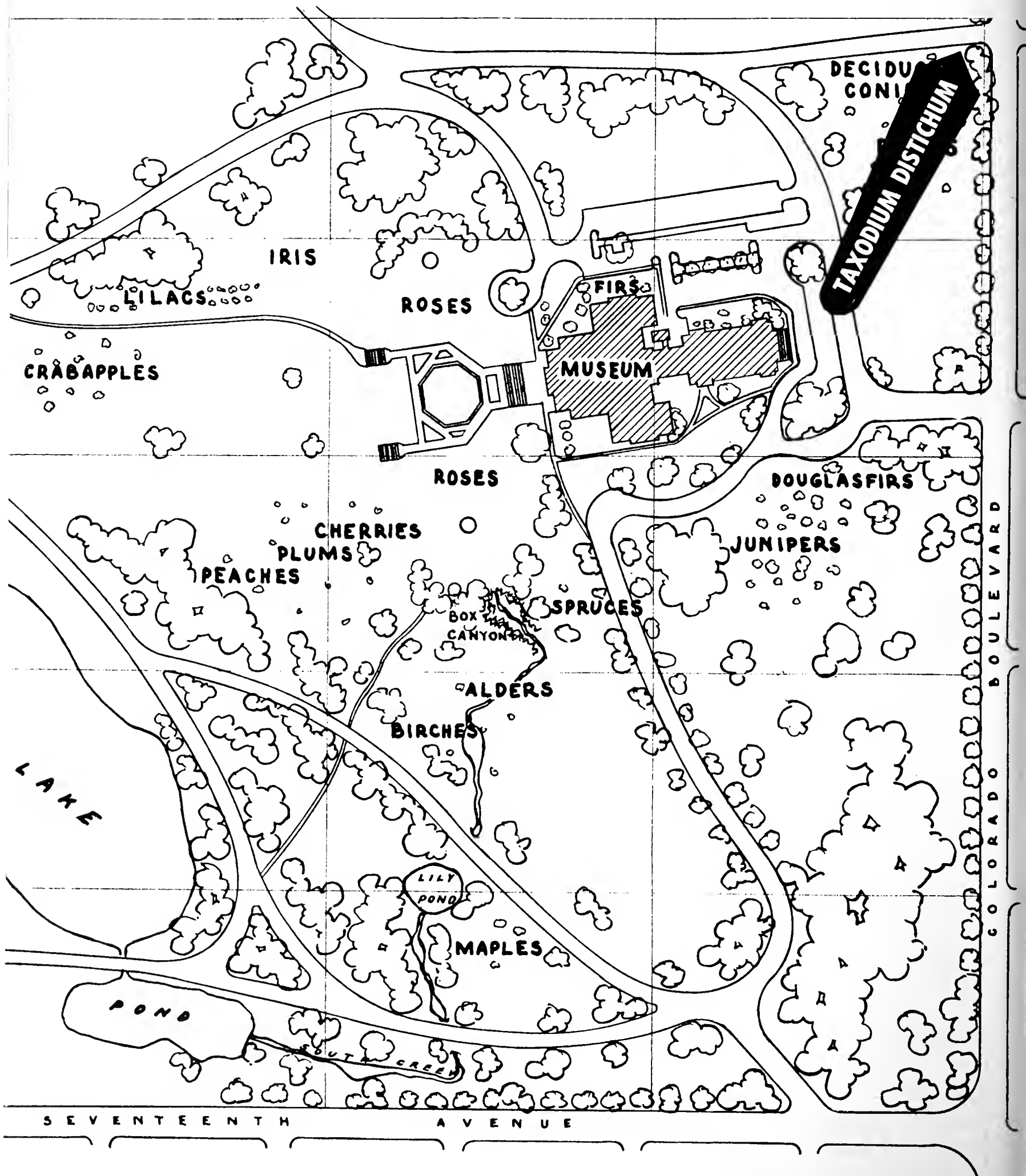
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DENVER BOTANIC GARDENS

City Park Unit



Unusual Trees

in the Denver Botanic Gardens

JOSEPH W. OPPE

SPECIMENS of the common bald cypress (*Taxodium distichum*) can be seen growing in Denver Botanic Gardens' City Park Unit. (See map for location.) These specimens were obtained from the Tingle Nursery Company, Pittsville, Maryland, and were planted in May 1958.

Taxodium distichum occurs natively from Delaware to Florida, west to southern Illinois, Oklahoma and Texas. In the southern portion of its range, it forms vast stands, either by itself or in combination with tupelo (*Nyssa aquatica* and *N. sylvatica biflora*), ash (*Fraxinus caroliniana* and *F. tomentosa*) and red maple (*Acer rubrum*).



Foliage of *Taxodium distichum*.



Taxodium distichum growing
at the City Park Unit.

The common bald cypress will dominate in areas where water stands most of the year. When growing under these wet conditions, it will form the "cypress knees" so common to the tourist trade of the southeastern United States. These structures are thought to serve two purposes: They facilitate the aeration of the tissues making up the roots; and they aid in supporting the aerial portion of the tree by increasing the total mass of the root system. Though *Taxodium distichum* occurs spontaneously in wet, swampy areas, it will also grow quite nicely in well-drained soils.

Common bald cypress is characterized by its narrow-linear, acute, thin, light green leaves. These leaves (needles) are deciduous and $\frac{1}{2}$ to $\frac{3}{4}$

inches long. The leaves are two-ranked and from this character comes the species name of *distichous*, from the Greek *distichos*, meaning disposed in two vertical rows like the barbs of a feather.

The common bald cypress is not particularly well adapted to culture in the Denver area. At best, it can be thought of as marginal in hardiness. It was given an "F" in the list of plant hardiness ratings which appeared in the No-

vember-December 1963 issue of *The Green Thumb*. This "F" rating indicates that little information was available on the culture of the common bald cypress in Denver.

The common bald cypress should be planted in a protected area, such as to the north of a building or group of plants. Chlorosis may be a problem but this can be overcome with the application of soluble iron compounds.



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1964 PLANT SALE

THE PLANT SALE COMMITTEE wishes to express appreciation to the many persons and firms who cooperated to make the 1964 Plant Sale a success; to the vast number of donors who contributed their excellent plants; to the staff of Denver Botanic Gardens for their assistance "beyond the call of duty"; to Dr. A. C. Hildreth, Mr. Michael Ulaski and Mr. William Lucking for their invaluable aid in the committee's quest for plant knowledge; to Ragnar Bramberg and his gardening staff for the numerous chores performed in our behalf; to all the volunteer workers for the countless hours spent in presale preparation and sales work; to Mrs. Albert Petrick, Mrs. John McCormick and Mrs. John W. Newman for the tender care given the plants which were stored in their greenhouses; to the Editorial Committee and all the contributors to the plant sale (April 1964) issue of *The Green Thumb*; to Mrs. James P. Steele, Jr., for the delightful cover which she designed and drew for the plant sale issue of *The Green Thumb*; to Swingle Tree Surgeons, Inc. for the use of their truck; to Mr. Herbert Gundell, Mr. Patrick Gallavan, Dr. Helen Marsh Zeiner, Mrs. William H. Crisp, Mr. Earl Sinna-mon and Mr. Joseph W. Oppe for their expert advice; to the Colorado Sign Company for the donation of material

and labor for signs; to Mr. J. V. Petersen for erecting the signs and donating the use of his truck; and to the many businesses for their help and donations to the refreshment booth.

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Mountain Parks

PAT GALLAVAN, *Director, Denver Mountain Parks*

THE DENVER MOUNTAIN PARKS are known throughout the world. Their acquisition and development is a tribute to the farsighted citizens of Denver at the turn of the century. As we trace their development we find that the finest progress came during the years 1937 to 1941 when the City qualified for assistance from both the W.P.A. and C.C.C. programs. Working from a master plan prepared by the National Parks Service, men and equipment from these two public work projects were able to give Denver and its citizens the finest out-of-city park system in the world. It was during this period that the famous Red Rocks Theatre was completed along with extensive picnic and recreation facilities in many parks like Genesee, Fillius, Bergen, Dedisse and others.

Unfortunately during the war and the booming years that followed the Mountain Parks were placed on a minimum maintenance budget. Since this budget was insufficient to meet both the maintenance and replacement needs there was a gradual deterioration of its buildings, picnic facilities and in some cases the land itself.

In 1960 a survey was made of all the Mountain Parks areas. This survey included usage, condition of present facilities, and improvement needed at each

location. In this survey our resources in men, equipment and materials were also inventoried. After a careful study and much reshuffling, a plan for the gradual restoration of our existing parks evolved.

With the assistance of Frank Dillon, Chief Probation Officer of the Denver Court, an honor crew from the County Jail was made available for Mountain Parks work. Their first project was the rehabilitation of Dedisse Park at Evergreen. In this park these men built retaining walls and barrier rails in the parking areas, repaired toilets and replaced picnic units, and constructed check dams where erosion was severe. Since that time they have done similar work in Genesee and Stapleton Parks. Last year with the aid of \$10,000 in capital improvement funds they were able to start construction on a new park area in Cub Creek. Here they have built parking areas, roadside pull-offs, foot bridges, toilets and installed some 50 picnic units. This season we plan to use this crew in Stapleton, Fillius and O'Fallon Parks for additional restoration projects.

In 1962 Judge Philip Gilliam made available another honor crew from Juvenile Hall. During their first summer this crew worked in Deer Creek Park cleaning brush and installing new



Picnicking in a Denver Mountain Park.

picnic facilities. In the fall they were transferred to Daniels Park where they started to work restoring picnic facilities at that location. Since it was desirable to continue this program through the winter months a shop was set up in a barn at Daniels. Through some ingenuity, begging and borrowing of tools these boys were soon engaged in making much needed rustic wood signs for our parks. Their success in this endeavor can be noted at the York Street Unit of Denver Botanic Gardens where many of their signs are in evidence. In addition to making signs, this past winter they assembled over a hundred picnic tables for the Cub Creek and O'Fallon Park projects. Because of the success of this program the Capital Improvement Committee granted Juvenile Hall funds to purchase a mobile trailer unit to house the boys working on the mountain parks projects. This summer this unit will be based at Newton Park. Plans for this park call for the eventual construction of three reservation areas for large group picnics. This year the boys will work on improving the existing facili-

ties such as toilets, playfield, roads and parking.

Most of the work so far described was made possible by the availability of these two honor crews, however, it should be mentioned that they have been assisted by supervision, equipment, and materials from the regular Mountain Parks crew. This crew, in addition, has kept up with the ordinary maintenance and has made additional improvements to a number of our facilities. Through relandscaping they have improved the appearance of Red Rocks Pueblo, Buffalo Bill's Museum, Evergreen Golf Clubhouse. They have also improved the facilities at Hosa Lodge, Evergreen Lake and other areas.

We have also had a number of successful projects accomplished by the Girl Scouts, the Boy Scouts and the 4-H Clubs. These groups have given valuable assistance in a number of conservation projects such as erosion control, tree planting and grass seeding.

While the progress is sometimes slow and discouraging we have made ad-

vances in the Mountain Parks in recent years and with the help of the capital improvement budget already approved we can look forward to the day in the not too distant future when we can plan and carry out the construction of new park areas that are undeveloped at present. Future plans call for many exciting ideas, on the priority list is the installation of a nature center in Red Rocks Park with ecological exhibits encompassing the mountain park areas from the plains to Summit Lake. At the present time the Colorado Cactophiles are considering a proposal to plant a native cactus garden in the Red Rocks Park. This garden would be located near the Pueblo Building and would be an excellent tie-in for our proposed nature center. Also in Red Rocks are plans for a lighting and sound system that would play concerts each evening during the summer months. Other projects call for improved winter sports areas in Pence, Berrian, and Evergreen Parks. New nature trails have been planned in a number of areas. The acquisition of additional lands to connect key park areas and for preservation of scenic and aesthetic values in our existing parks is contemplated in future plans.

It was mentioned earlier in this article that the Mountain Parks were given to us by the action of citizens



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THE COVER

NARROW-LEAVED PENSTEMON
(Penstemon angustifolius)

Original drawing from the Emma A. Ervin Collection.

REQUIEM—

Salute to a Valiant Lady

VELLA HOOD CONRAD fought the final battle with all the tenacious determination to win with which she met every challenge she encountered during her life. Her spirit never wavered but the physical ordeal was too great and on July 5, 1964, we lost another cherished friend. Her tumultuous spirit is at rest and we, who knew her well, will feel the silence in which she now rests where once we struggled to keep up with her dedicated forays against the exigencies of life.

In a way, Vella was a one-woman crusade—be it a cause, a person or a stray animal to champion, she unfurled the banner and went to work. In her opinion, there was no middle-of-the-road method for doing things, only the right way or wrong way. It is not at all hard to look back and recall how many, surprisingly many, times she was right.

In the old days of the Colorado Forestry & Horticulture Association, of which she was a life member, she was a whirlwind of activity. As a member of the Board of Trustees, she engaged

forcefully in nearly every project which was undertaken. She loved gardening and disseminated her acquired knowledge to all who needed help; worked diligently to increase the membership of the Association; she wrote for and did everything in her power to publicize *The Green Thumb* which was at that time published by the Association. Her first and forever love was the rose. She fought for a Rose Garden for City Park with her usual zeal at a time when most people were of the opinion that we couldn't do much with roses in this area. This is one of the instances where she proved she was right, for the Rose Garden in City Park, due greatly to her assiduous attention and research on modern horticultural practices, is a source of great pleasure to Denverites and visitors as well.

For a time, ill health subdued her energy, during which time the Colorado Forestry & Horticulture Association was dissolved and many of its activities were assumed by Denver Botanic Gardens. With the return of some of her earlier strength, Vella once again took up the cudgel and became one of the Gardens' staunchest supporters. The

rose beds planted in the York Street Unit were one of her enthusiasms and she spent many hours tending these beds, cultivating, fertilizing, supervising and just admiring the lovely blossoms. Any new roses she could beg, borrow or buy came to the Garden.

We shall miss her zest for life and we will miss the mischievous twinkle that came into her eyes when she knew she

had scored a point. She referred to herself as a "Georgia Rebel," which indeed she was, even as a Colorado transplant. In living, she gave a little bit of herself to all of us and, thus, gained stature for herself. It is to be hoped that the garden to which she must have surely gone will bring her the same peace which she derived from the one she loved so dearly here on earth.

The hot days of August will bring the cool days of October. Now is the time for shearing and pruning evergreens.

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RED OWL

Victorian Cutting Garden

at

BLOOM MANSION MUSEUM

DOLORES PLESTED

A VICTORIAN CUTTING GARDEN, possibly the only one of its kind in the country, and a Victorian rose garden, are being developed to provide a setting of rare beauty for the Bloom Mansion Museum in Trinidad, Colorado.

The ornate mansion, built in 1882, by a wealthy cattleman overlooks this southern Colorado town's Main Street, once the mountain branch of the famous old Santa Fe Trail.

The Victorian cutting garden at the rear of the towering, three-story home of the pioneer Pennsylvania-born Colorado merchant, banker and cattleman, Frank G. Bloom, was started two years ago before the museum itself was officially opened.

Now, in its third summer, it reflects the type of plants the western gentlewoman of the 1880's put into her garden — just as the Bloom Mansion itself is a faithful reflection of the transfer of the culture of the eastern United States to the new west.

Dr. James Grafton Rogers, chairman of the board of the State Historical Society, and distinguished Colorado

attorney and scholar, who designed the garden after months of research, said the garden project is "unique in an effort to reproduce flowers of that period."

Both the flowers and vegetables found in the western garden of that period were there for utilitarian purposes — the flowers for bouquets to grace the house, the vegetables for the table.

Most of the plants put in the gardens in those days were not horticultural varieties, Dr. Rogers pointed out. They were in their original form as cultivated in the east for 200 or 300 years, and just as they had come over from Europe in the early days. Few of them were bred or hybridized. The present vogue for breeding innumerable varieties of flowers, new each year, was scarcely known in those days, he said. Roses were one of the few flowers to receive such attention.

Flowers selected for the garden by Dr. Rogers and supplemented by H. B. "Brandy" Doveton, expert amateur gardener of Trinidad who is directing the garden development, combine the



Bloom Mansion Museum

old-fashioned types brought from the east with a number of Colorado wild flowers including Colorado's state flower — the Colorado columbine.

The major section of the Victorian flower garden stands where a chicken house and a barn housing the buggy team and milk cows, once stood.

It is laid out in the form of an oval about 100 feet long and 52 feet wide. A 5-foot gravel walk edged with old sand brick set diagonally circles the garden, with paths leading through the beds, as in the early days, to make it easy for the mistress of the house to pick flowers for her bouquets.

A center grass plot is designed to hold a cast iron urn or birdbath. According to Dr. Rogers, the only garden decoration common in the 1880's was an urn.

A curving walk leads from the cutting garden to a wrought iron gateway which opens into the adjoining courtyard of the Old Baca House and Pioneer Museum, also a part of the block-long museum complex.

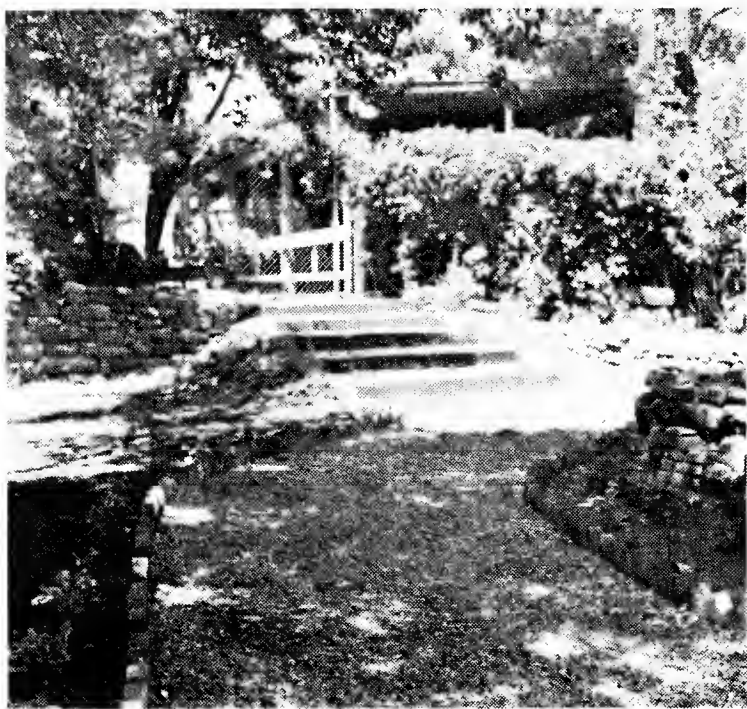
Garden plots including a vegetable garden of corn, lettuce, onion, asparagus, rhubarb, and other vegetables are planted here. Another walk leads down steps to the lower level of the main yard through a grape arbor to the back door of the house.

On one side of the kitchen door is a small herb garden which includes a number of more commonly used herbs in that day — chive, dill, sage, thyme, oregano, sweet lavender, sweet basil, and mint. On the other side is a bed of Rocky Mountain bluebells.

In the main cutting garden, and in

various beds around the yard are planted both annuals and perennials common in the 1880's — some rarely found in today's gardens.

Among those planted in the garden to date are: ageratum, aster, baby's-breath, bachelor's button, bee balm, bellflower, bleeding heart, border pink, bouncing bet, butter-and-eggs,



A view of the Bloom Mansion gardens

calendula, candytuft, Canterbury bells, columbine, coralbells, coreopsis, cosmos, dahlia, day lily, deptford pink.

Dusty miller, dwarf summer phlox, English daisy, evening primrose, forget-me-not, four-o'clock, foxglove, garden pink, geranium, gloriosa daisy, hollyhock, honesty (moneywort), hosta, larkspur, lobelia, love-in-a-mist, loves-ies-bleeding, lupine, marguerite, several varieties of marigold.

Monkshood, morning glory, myrtle, nasturtium, painted daisy, pansy, peony, periwinkle, several varieties of petunia, phlox, pincushion flower, primrose, Queen Anne's lace, salpiglossis, scarlet runner, snapdragon, sweet alyssum, sweet william, violet, zinnia.

On the west side of the Mansion, beds edging the lawn hold many of Colorado's native wild flowers — some were already growing in the yard when

the house was built, others were brought from the Stonewall Mountain country west of Trinidad by Mr. Doveton especially for the Bloom Mansion gardens. Many of these were carefully nurtured in his greenhouse before transplanting to the garden.

Here are found the Colorado columbine, bottle gentian, Johnny-jump-up, wallflower, sand lily, yellow evening primrose, fire penstemon, forget-me-not, Indian paintbrush, Rocky Mountain bluebells, wild sweetpeas, lupine, loco, yellow glove, wallflower and wild strawberry.

The Victorian Rose Garden featuring nearly 80 old-fashioned roses, primarily those propagated in the years of Queen Victoria's reign (1837-1901) was added this spring. It occupies a 75-foot by 4½-foot bed along the east wall at the front side of the museum.

Bryand Williamson of Englewood, Colorado, one of the country's authorities on old-fashioned roses, and a member of the American Rose Society, helped select the roses for the Trinidad garden.

Considered in the selection was suitability to this climate, and only those roses which had flourished in Mr. Williamson's garden, which contains the largest collection of old-fashioned roses in the Rocky Mountain region, were chosen.

Effort was made to have as many types as possible that would bloom

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during, or through the Museum season — May 30 through October 15 — each year.

"One thing you can say about roses of the Victorian period and before, is that they have stood the test of time. They have survived because they are

the best of the best," Williamson said.

The roses were shipped to Trinidad by two firms that deal in rare and unusual roses — Will Tillotson's Roses, Watsonville, California and J. J. Kern Nursery, Mentor, Ohio.

The collection includes hybrid perpetuals, older hybrid teas, moss roses, Damask roses, Bourbon roses, polyantha roses and the China rose. Among them are 'Paul Neyron' (1859); 'Blanc Double de Coubert' (1892); 'Belle Poitevine' (1894); the green rose (1856); 'Harison's Yellow' (1830), the rose that practically marked the trail of the Forty-niners.

Also 'Nastarana' (1878); 'Prince Camille de Rohan' (1861); 'Mme. Ernst Calvat' (1888); the old red moss rose; 'Souvenir de la Malmaison' (1843); 'Salet' (1855) and many others.

To help finance the cost of the roses, the markers, and their care, individuals and clubs in Trinidad and Denver made donations of \$5.00 each to have a rose bush planted in their names in honor or memory of an individual.

A small folder giving the dates the roses were hybridized, and a little of their history, is planned and will include names of donors and the memorials or tributes. In this same folder, or possibly a separate one, the story of the Victorian cutting garden will be told, with some details and history of the flowers planted here.

The Bloom Mansion Museum which was officially opened in the summer of 1963, is owned by the State of Colorado and maintained by the State Historical Society.

The Friends of Historical Trinidad, Inc., of Denver, Colorado, made up of former Trinidad residents, and the Trinidad Historical Society, Inc., of Trinidad (both non-profit organiza-

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tions) raised the funds to purchase the Bloom Mansion. The money was given by former Trinidadians living in all parts of the country. The house was presented to the people of Colorado in 1961.

Bloom built the house during a period when many of the biggest cattle companies in America made Trinidad their headquarters.

Cattle scattered from New Mexico to the Milk River in Montana bore the Bloom Cattle Company brands, the Diamond A and Circle Diamond.

Visitors who come to view the Victorian gardens and the Bloom Mansion as well as the Old Baca House and Pioneer Museum, set high above Trinidad's Main Street, will be looking down on the historic Santa Fe Trail where fur traders travelled to New Mexico, and later, canvas-covered

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wagons wound their way to Santa Fe and Taos and back to the Missouri River.

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During the American epic period starting in 1821, the old trail saw the Indian resistance begin and end; saw the free trapper with his beaver pelts; saw the buffalo herds; the freight wagons and the stagecoach come and go.

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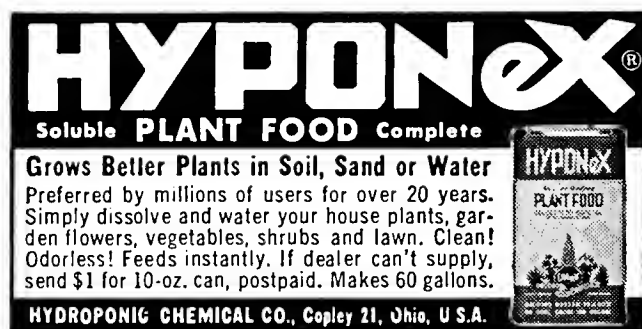
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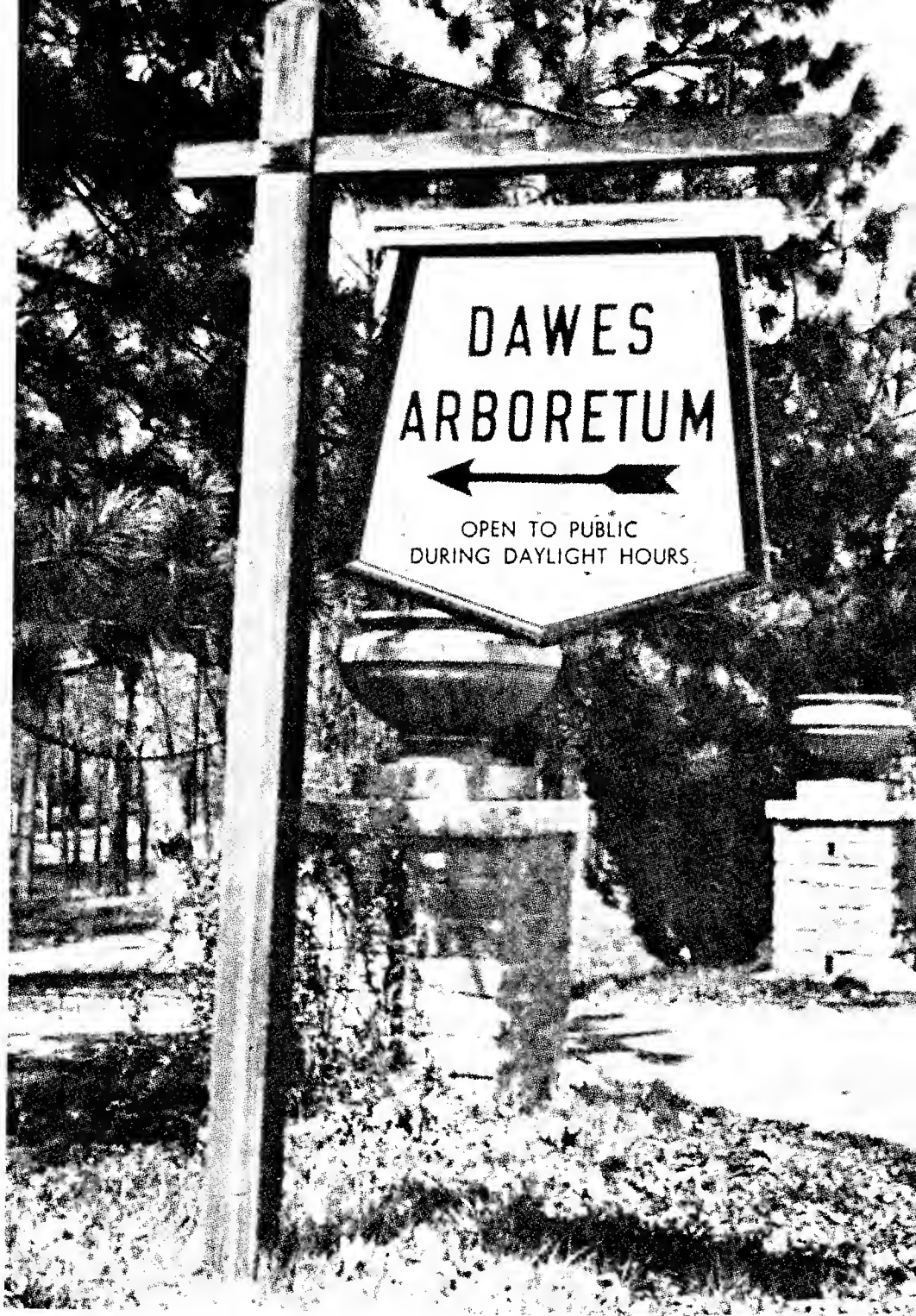
The Arboretum is an endowed institution and all funds are derived from the endowment and no county, state or federal money is involved. The Arboretum consists of about 500 acres in all — 300 acres are devoted to the arboretum proper and the remainder is available for further expansion.

The Arboretum is open to the public seven days a week during daylight hours. The trees are well marked and can be viewed from an automobile while driving through the Arboretum.

The greatest of our attractions are the 60 acres of virgin beech-maple forest in addition to the varied plantings of exotic trees, shrubs and evergreens. Original forest plantings were made in 1923 and 1924 and various rare trees have been added from time to time. Those of you in the Denver area should be interested in our cypress swamp. This planting consists of one acre along Ohio Route 13 where the common bald cypress (*Taxodium distichum*) are over 40 years old and clearly show their "knees."

Features added in the past few years are an 8-acre lake which was completed in 1955 and a crab apple orchard which was planted in 1959 and which now consists of three trees each of some 60 varieties. Another of our newer interesting plantations, consisting of about 100 dawn redwoods (*Metasequoia glyptostroboides*) promises to be a very interesting tree for our Ohio area.

It will interest people from the Rocky Mountain area to see Colorado spruce, Engelmann spruce, Douglas fir and other trees which are native to Colorado.



All of these are 20 to 30 years old but it will be a century before we can tell whether or not they will approach the heights that they reach in your area.

In 1963, Professor Makoto Nakamura a professor of landscape architecture in the School of Forestry, College of Agriculture, Kyoto University spent the summer with us, and personally designed and developed a Japanese garden which consists of about 3 acres with a 1-acre lake. The construction of this garden has been completed but various plantings under the direction of Professor Nakamura will be added during the next year or two.

Gradually, new study areas are being provided where many conifers (pines, spruces, firs, etc.) will be concentrated so that a serious student will be able to go from tree to tree and make comparisons. Naturally, it will take quite a few years before any appreciable growth will occur, but as the Arboretum is devoted to the pleasure, education and entertainment of the general public, an enjoyable time can be spent there.

An additional feature are the trees

planted by prominent individuals over a period of time. General John J. Pershing dedicated, in 1928, an avenue bordered by American elms, known ever since as "Pershing Avenue." Since that time, many famous military leaders have dedicated trees along this avenue.

Unfortunately, Ohio has lost practically all of its American elms to the ravishes of the Dutch elm disease and phloem necrosis. The elms along Pershing Avenue have been replaced by a

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row of swamp white oaks and a new variety of elm, the 'Christine Buisman' smooth-leaf elm, which is resistant to the elm diseases which have destroyed so many of our beautiful elm trees in the midwest.

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UNLESS A LAWN is started properly it can never be an excellent lawn. The axiom "haste makes waste" applies to the proper establishment of a lawn. An excellent lawn is a deep-rooted, dense stand of fine-textured, even-colored grass plants. It will stand abuse, and wear and has a high degree of drought and disease resistance. The best time to plant a lawn in the Denver area is in late August.

The excellent lawn is achieved when one follows a few proven practices. Short cuts can result in something less than is desired. A good lawn may cost a little more to establish, but the extra money spent quickly returns in reduced maintenance costs. If lawn appearance and self-satisfaction in achievement have monetary values, consider the following suggestions carefully.

Seedbed Preparation: The objective is a rooting zone of soil 6 to 8 inches deep and uniform in all characteristics. Layering must be avoided. Anything added, to the soil on site, must be uniformly applied and uniformly incorporated in the rooting zone. Without reliable information on what the soil contains, but based on previous experiences, it is usually desirable to add 10 to 15 pounds of available phosphorus and up to 4 cubic yards of organic matter for each 1,000 square feet of area. Peat, compost and leafmold are safe forms of organic matter.

It is not advisable to use more than 2 yards of animal manures. Animal manures can increase the salt content to the extent that grass seedlings cannot become established. The seeds sprout; the seedling starts to grow and then wilts and dies. This is most likely to occur on soils already high in total salts and when the area has not been watered several times during preparation and previous to planting.

The soil should be firmed and leveled by repeated watering and raking. Be sure final grades provide surface drainage away from walks, drives and buildings. Be sure soil replaced over buried utilities is thoroughly firmed. High spots, low spots and areas where the soils in the rooting zone vary are spots that will always be seen; each spot requires a different management practice.

Selecting the Seed: This is the easiest job of all. A single grass is better than a mixture. Nurse or companion grasses are unnecessary; actually they are competitive. The bent grasses; the fine leafed or lawn fescues and Kentucky bluegrass and its selections are all well adapted. Bent is a luxury grass requiring more maintenance than most people have time for, or can afford. The fine leafed fescues are more difficult to mow and lack some in appearance when compared to bluegrasses.

In recent years many selections have

been made from Kentucky bluegrass. 'Merion', 'Park', 'Newport', 'Windsor', 'Aboretum', 'Delta', 'Troy', 'Campus', 'Prado' are named selections from Kentucky bluegrass. It is assumed each one has some superior characteristics which might make it more adaptable to particular locations. 'Merion', however, is the only one that has been observed long enough to really determine its value. It does have a superior appearance as compared to Kentucky bluegrass. In selecting the kind to plant the fact still remains that common Kentucky bluegrass is a mixture of many named selections and undoubtedly contains strains not yet selected or named.

Planting: Three pounds of seed per 1,000 square feet is sufficient. The seed bed need not be finely pulverized; pea size clods are a help on soil that crusts. To secure an even distribution

of seed, divide the total amount of seed for an area in two equal parts. Broadcast one part going back and forth across in two directions; the second half is applied in the remaining two directions.

After broadcasting the seed the seeded surface may be raked lightly. Apply a thin mulch $\frac{1}{8}$ to $\frac{1}{4}$ inch and roll to firm the soil, seed and mulch. Possible mulching materials are peat, sheep manure and peat mixtures, leaf-mold, compost or sawdust. A daily light sprinkling with a misty spray will be necessary to germinate the seed and establish the seedlings. When the area starts to green, the interval between watering should be increased gradually. When the grass reaches a height of $1\frac{1}{2}$ inches, clip off $\frac{1}{2}$ inch. On future mowings, clip to remove $\frac{1}{2}$ inch of leaf blade and to leave the grass 2 to $2\frac{1}{2}$ inches high.

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KATHRYN KALMBACH

(Revised and reprinted from the August 1957 *The Green Thumb*)

TO MANY gardeners, August is the month when we would like to shut the gate on the garden, forget such things as spray guns, lawn mowers, weeds, hoes and never ending irrigation and run away to the mountains or seashore. But for stay-at-home gardeners, August brings its round of garden chores, along with glorious rewards for these tasks. August in Colorado may be the most colorful month of the year if we have done a bit of planning earlier. How many plants reach their peak growth, while still safe from even the earliest of frost damage.

The following suggestions may come too late for this year but we hope they may inspire a few garden notes for next spring's planning. Our cool nights and warm days at this time of year are ideal for growing many colorful annuals and most of them reach their peak of perfection in August.

We hope many of you planted some of the more unusual annuals along with the older favorites. *Godetia*, the satin flower of our grandmother's time, is lovely in pastel arrangements, easy to grow and not seen as often as it should be. *Arctotis*, the blue-eyed daisy; *Lavatera*, the annual mallow; *Nemophila*, baby blue-eyes; *Nierembergia*, dwarf cup flower; *Schizanthus*, butterfly flower or poor man's orchid; and *Tor- enia*, the wishbone flower, are some

others that are easy to grow, do well in our state and add interest to the garden.

Then let's not neglect other old favorites of grandmother's day—balsam, *Clarkia*, love-in-a-mist, painted tongue (*Salpiglossis*) and the pincushion plant (*Scabiosa*); all still worth growing. Another favorite, cockscomb (*Celosia*), is in high favor in these days of dried bouquets and now comes in lovely soft gold and pinkish shades, as well as the velvety reds of old.

Did you remember to grow some "everlastings" for those winter bouquets? Globe amaranth and strawflower are both easy and good. While on the subject of winter bouquets, now more appropriately called "dry arrangements," we hope you are leaving a few interesting seed pods to ripen for use with colorful borax-dried flowers. All good gardeners are supposed to keep flower borders neat by cutting off all faded blooms but let's not be so neat that we miss out on the beauty of some of the ripened seed vessels. We are all familiar with the very ornamental seed pods of the annual and perennial poppies, but many others may surprise you with their beauty.

If you staggered your planting of gladioli and are enjoying some lovely late blooms, try leaving a spire or so to ripen and dry. A gladiolus seed head is seldom seen and is so very ornamental.

This month the perennial border should have plenty of interest and color. The phlox in many shades, the michaelmas daisies, both tall and dwarf, the early blooming chrysanthemums and many lilies are all to be relied upon for copious bloom. This is the month to divide Oriental poppies and to start seeds of sweet william and Iceland poppies for bloom next season. These and some others benefit by being given time to establish themselves before cold weather.

This is the month, too, to enjoy the herb garden, sniffing sweet scents and garnering savory flowers for later use. A few snips of salad burnet in the salad brings a cool cucumber taste on a warm August day. Pour hot cider vinegar over generous sprays of tarragon. You will never want to use plain vinegar again! Make some basil vinegar the same way and don't forget that leaf or two of sweet basil in each jar

of tomatoes as you can them. Your fresh rubbed sage, rosemary, thyme and marjoram far excel any on the grocer's shelves. Dainty sprigs of chervil make a delightful garnish for any dish. We hope you love the sprays of lavender flowers among your linens. Last, but not least, remember the many mints, planted where they may flourish without driving out their neighboring plants.

As you enjoy the bright colors of the August garden by day, we hope you are also enjoying the beauty of many white and fragrant flowers in the early warm evenings. As the evening shadows fall there is nothing so cool and refreshing as the accents of white flowers you have provided in your garden. White petunias, white perennial phlox, white nicotiana and white chrysanthemums, etc., are all part of the enchantment of a garden by moonlight!



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THE ENCHANTED MESA

IN JANUARY, 1964, the city of Boulder started proceedings to acquire 146 acres of land located in the foothills at the edge of Boulder. The city wished to purchase the land as an addition to its mountain parks system for no more than \$105,000 approximated by the Boulder tax payers at a bond election in 1962. When the bond issue proposal was set at \$105,000, it was estimated that the land would cost no more than that and it was hoped that some money would be left over for development of recreational facilities on the Enchanted Mesa or adjoining areas of the Boulder mountain parks. The Enchanted Mesa lies immediately south of the Chautauqua Reservoir and east of the Bluebell canyon picnic shelter house and the Flatirons rock formation.

After considerable litigation a court commission established the price of the Enchanted Mesa at \$115,000. The award fixed by the three commissioners was \$10,000 above the \$105,000 bond issue approved by Boulder tax payers in 1962. Approximately \$20,000 more than this bond issue will be needed to cover bond expense and other costs.

Following the final hearing on the Enchanted Mesa property the City Council voted to go ahead with the purchase if there is no further litigation. The additional \$20,000 needed may come from other park funds. The City plans a drive for public contributions hoping for a few large donations and many small ones. Thus it will be possible to preserve this area in its natural state as a wilderness area along the city's foothills backdrop.

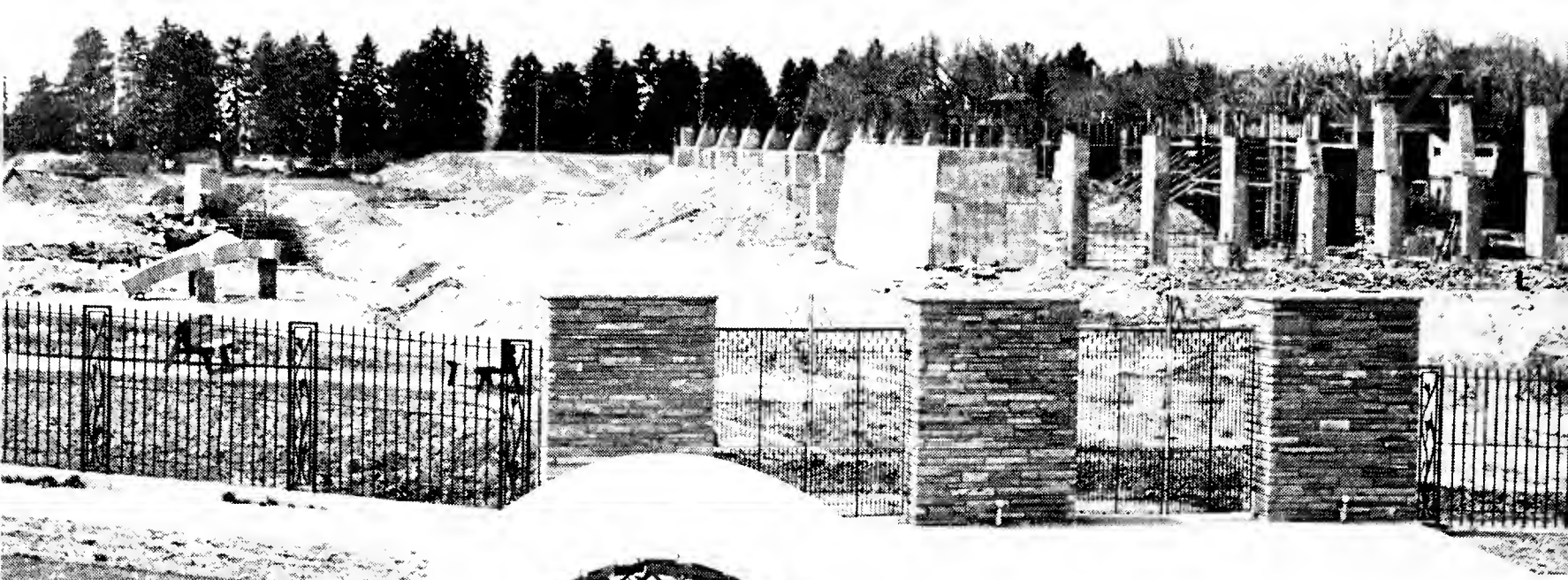
THE M. WALTER PESMAN NATURE TRAIL

THE LATE beloved M. Walter Pesman has again been honored by having a mountain trail dedicated to him. On June 4, 1964, the Grand Junction Garden Club designated an area several miles up the Little Park Road as the M. Walter Pesman Nature Trail. Colorful cliffs vie with rocky promontories in forming a picturesque background for the wild flowers, cactus, scrub oak and yucca which abound along the trail.

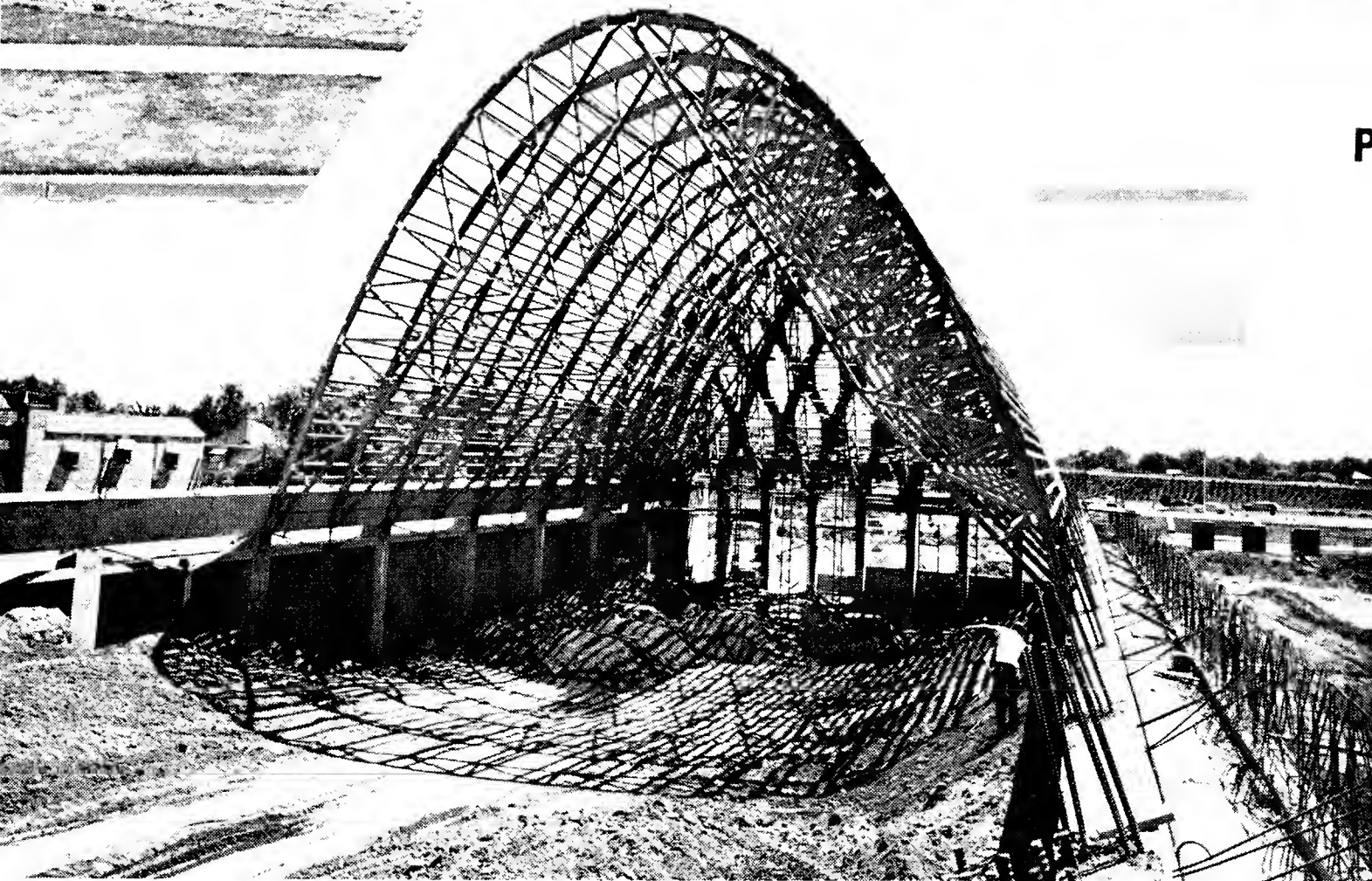
Mr. Pesman had contributed much of his time in assisting the Grand Junction Garden Club with civic projects, helped with the planning of Lilac Park and also conducted landscape de-

sign classes for the group. This is a very significant tribute to the memory of Mr. Pesman, whose son, Gerard, is a resident of Grand Junction.

The first trail named in his honor is located in the Denver Botanic Gardens Alpine Unit on Mt. Goliath. During a very active lifetime, Mr. Pesman was a member of the Board of Trustees of Denver Botanic Gardens, served as Historian for the organization and contributed much of his time and skill toward the development of the Gardens. It is most appropriate, therefore, that the author of "Meet the Natives" and "Meet Flora Mexicana" should be honored with these living memorials.

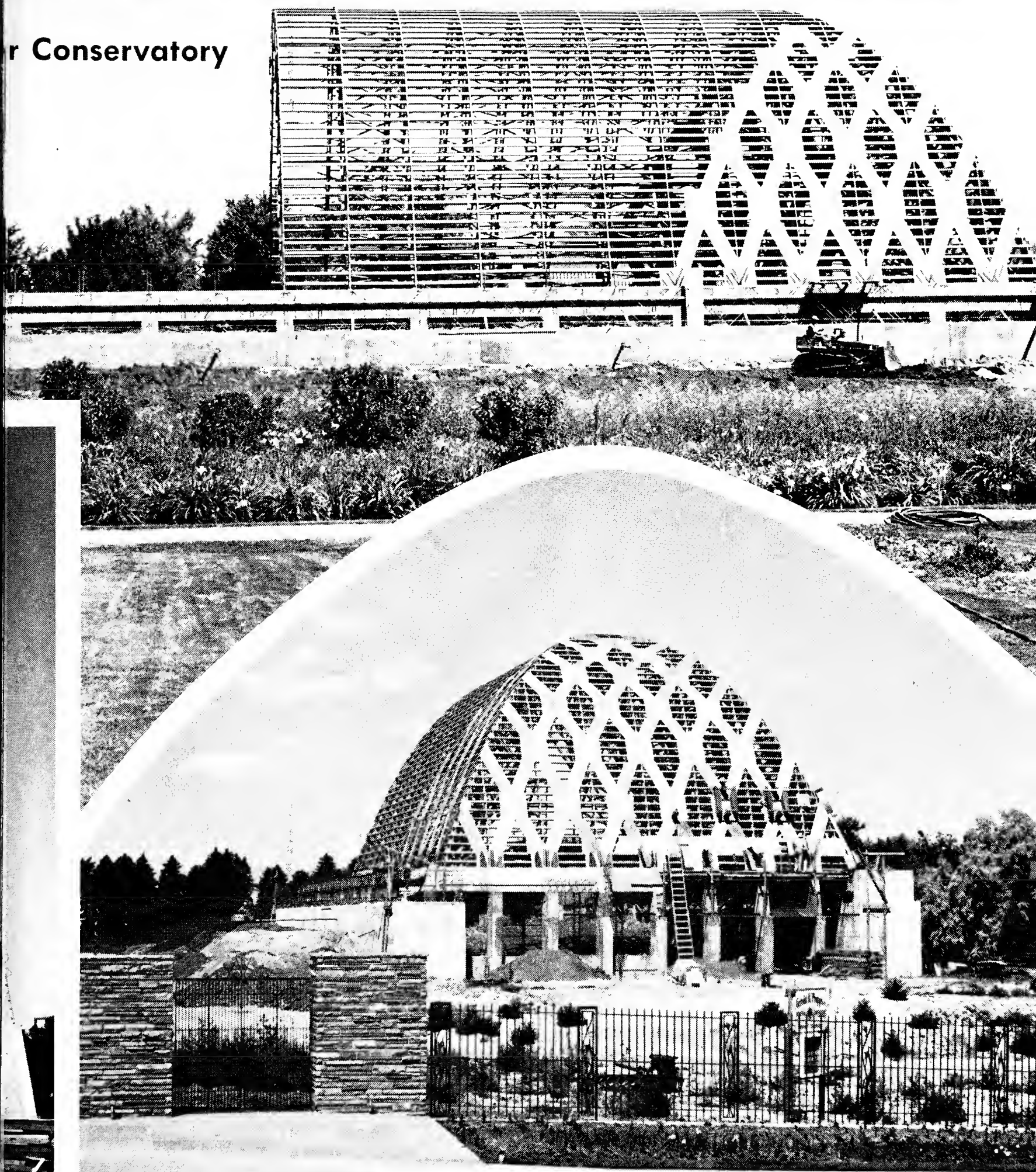


Progress





r Conservatory



Photographs by Jack Fason

Peonies

WILLIAM LUCKING

THE PEONY is often referred to as the "Queen of the June flowers." Planted in the proper location, it will give satisfaction for a number of years. It is one of the most hardy herbaceous perennial plants and is relatively free of insects and diseases. Sometimes ants will be seen on the peony buds but they are feeding on the sweet sap and do not harm the peony.

The peony likes a sunny location, good, well-drained soil and does not like to be too close to trees or shrubs. It does well in the perennial border. When planting peonies, it should be remembered that they will remain in the same location for a number of years, so it is essential that the soil is good. If you are lucky enough to have a clay subsoil, so much the better. A location that has sand or gravel for a subsoil is not suited for a peony bed.

A good planting method is to dig a hole 2 feet deep and put 8 or 10 inches of well decayed manure in the bottom. Fill the remainder of the hole with good loamy soil and pack it down. Peonies can be planted in the spring if they are planted early, but fall planting is to be recommended. Get good,

young healthy roots with three to five eyes (the reddish buds at the top of the tuberous root). Plant the peony in the hole that you have prepared, placing the eyes about 2 inches below the surface of the soil and making certain that the root does not come into contact with the manure. Water well after planting. Peonies require no special care after they are established. They will bloom year after year in the same location.

Now and then, a peony will be found that does not bloom. This may be caused by too much shade, excessively deep planting or competition. In some seasons there will be a late frost that will damage or destroy the flower buds. Whatever the cause, wait a season or so before digging up and destroying the root. Peonies have been known to go for several years without blooming and then, for no apparent reason, they will produce a large number of blossoms.

Peonies do not require a lot of water during the growing season but they do need a good watering in the fall. That is the time when they are producing new roots and eyes and deep watering



Majestic peony



'Nellie' peony

is necessary. Some persons make it a habit of removing the foliage after the plants have bloomed. This is not to be recommended as this foliage is needed to manufacture food which is necessary for the production of flowers during the coming season.

Recommended Varieties

The following list of recommended varieties is based on the experiences the author had while growing peonies for the cut flower market.

Early White — 'Festiva Maxima' is one of the oldest varieties but is still one of the best. It has good strong stems, large white flowers with flecking red center and good foliage. Another early white, 'LeCygne', is a large free bloomer with dark green foliage.

Early Pink — 'Edulis Superba' is a brilliant deep pink and very fragrant.

'Monsieur Jules Elie' has a very large compact deep pink flower. Like 'Festiva Maxima', 'Monsieur Jules Elie' should be in every garden.

Late Pink — 'Sarah Bernhardt' is a clear deep apple blossom pink with tall, good stems.

Very Late Pink — 'Livingstone' has large buds which open into a very large rose type blossom.

Early Red — *Paeonia officinalis rubra* is the earliest blooming peony with dark red flowers borne on short stems. 'Augustin d'Hour' is a large compact red peony.

Late Red — 'Mary Brand' is a tall dark red peony with very good stems.

Yellow — 'Primevere' is the only peony that comes near to being yellow. It has white guard petals on the outside, a bomb type center and is fragrant. If one is looking for something different try the cut-leaf peony (*Paeonia tenuifolia*) which has a dark red flower and is the earliest peony to bloom. It can be grown in the rock garden as it is quite low. The Japanese peonies are also interesting. They have pink, white and red flowers with yellow centers.

If your garden has the room, it should include some peonies.

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? ? ? ? ?

Pete

Ponders

? ? ? ? ?

Dear Pete,

While visiting in Illinois last spring we were given a young redbud tree. Now what shall we do to develop it into a pink-flowering spectacle like the one that bloomed near Botanic Gardens House last May?

Hope Ful

Dear Hope,

We hope you planted your treasure on a north or east exposure. Many less hardy plants often survive and thrive when planted with such protection from the sun. Reduce the amount of irrigation the latter part of August and during September to harden the plant; however, be sure to irrigate heavily after leaf-fall and before the ground freezes so the roots have sufficient moisture. (Sounds contradictory, but it works.)

If you planted the tree in the open I'd offer 5 minutes of silent prayer and then proceed as usual by wrapping the trunk as high as practicable with tree wrap or strips of cloth. If you prefer, encircle the tree with screen wire within a few inches of the trunk to provide necessary shade. George Kelly maintains it's the 2 o'clock winter sun that causes most plant injury here. Incidentally, if you have tender evergreens protect those



plants with sections of snow fence to prevent sun and windburn.

If your tree is planted in an unfavorable location don't despair. Our redbud is growing and blooming in the open among many drought-enduring natives. Most plantsmen gasp at its location, but it, too, is a native of somewhere, so we tucked it in with the others and gambled. Two or three years ago when much winterkill occurred in tender trees and shrubs our cherished redbud wintered well. We surmise the lack of regular irrigation had caused the tree to harden off for the rigorous winter ahead. In discussing our tree's survival with our leader, Dr. Hildreth, I learned he was astonished to find forests of an Asiatic species of redbud in the Far East growing on desert-mountains in the Hindu Kush range. Yet, as a youngster he had known redbuds growing in West Virginia with an abundance of moisture. Doubtless the species differ, but growth conditions of the genus *Cercis* are varied indeed.

Again a point proving our need to test numerous ornamentals for their adaptability here at Botanic Gardens for use in this region.



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BOOK REVIEW

DR. HELEN
MARSH ZEINER

BOTANIC GARDENS library has added to its shelves a new book on house plants, *The World Book of House Plants* by Elvin McDonald, published by The World Publishing Company, 1963.

Any good house plant book must include good instructions for general house plant care and good sections on soils, pots, potting, propagation, and pests. This book meets these requirements very adequately.

Features which make this book a bit different from the usual book on house plants are chapters on herbs, hanging baskets, and growing plants under fluorescent lights. Most impor-

tant is a section called "An Illustrated Encyclopedia of Indoor Plants." This section groups plants by families. Most of the well-known and some not-so-well-known house plants are included. Instructions for general care are given. There are line drawings of many plants. This arrangement shows relationships nicely. The house plant grower who wants to know more about plants will enjoy this section.

Mr. McDonald has also included useful lists of "Books of Interest to Indoor Gardeners," "Periodicals About Indoor Plants," and "Where to Buy Indoor Plants and Supplies for Growing Them."

BOOKS AND BOOKLETS FOR SALE

Title	Author	Price
Alpine Wildflowers of Rocky Mtn. Nat. Park.....	Bettie E. Willard and Chester O. Harris	\$.75
Around the Seasons.....	S. R. De Boer	1.00
Colorado Wild Flowers.....	Harold and Rhoda Roberts	1.25
Field Guide to Rocky Mountain Wildflowers.....	John J. Craighead, Frank C. Craighead, Jr. and Ray J. Davis	4.95
Front Range Panorama (with map).....	Colorado Mountain Club, Edited by Louisa Ward Arps	3.75
Fruit Key & Twig Key (Trees and Shrubs).....	William M. Harlow, Ph.D.	1.25
Good Gardens in the Sunshine States.....	George Kelly	3.00
Handbook of Plants of the Colorado Front Range.....	William A. Weber (Soft Cover) (Hard Cover)	3.00 5.00
How to Identify Plants.....	H. D. Harrington and L. W. Durrell	1.45
International Code of Nomenclature for Cultivated Plants...	International Nomenclature Commission	.65
Meet Flora Mexicana.....	M. Walter Pesman (Soft Cover) (Wire-O-Bound)	4.00 5.00
Meet The Natives.....	M. Walter Pesman (Soft Cover) (Wire-O-Bound)	3.00 3.60
Mountain Wildflowers of Colorado.....	Rhoda N. Roberts and Ruth Ashton Nelson	1.25
Planning for America's Wildlands.....	A. H. Carhart	2.50
Plants of the Rocky Mtn. National Park.....	Ruth Ashton Nelson	1.10
Saga of a Forest Ranger.....	Len Shoemaker	5.00
Secret of the Green Thumb.....	Rebecca Northen	5.00
Trees of North America (Box of 60 colored cards picturing tree, leaf, bark and fruit with an analysis of the tree's habits).....		2.00
Western Birds of North America (colored picture cards of birds as above).....		2.00
Also available: Botanic Gardens House Note Paper — 15 per box with envelopes.....		1.00
"Drying Plant Materials for Arrangements" — Detailed for Individual Plants...		.10

Yearning for *Roses?*

DORIS SHORTT

DO YOU YEARN for more roses? Perhaps some of your roses suffered winter damage. After a feeble start some of your roses may have managed to grow but lacked the vigor to produce blooms. Others, perhaps, wilted and died. Maybe you saved spaces in your garden for roses but neglected to get bare-root plants and failed to find the wanted varieties in containers.

Yearn no more! Fill these spaces with cuttings from your own favorite roses. The requirements are only a little time and effort and the dividends are satisfaction and a feeling of accomplishment.

The method which has proven successful for me is to take these cuttings during the month of September as there seems to be a higher percentage of success then. But, cuttings can also be taken in June, July, August or Octo-



ber. August is a very good month to start cuttings.

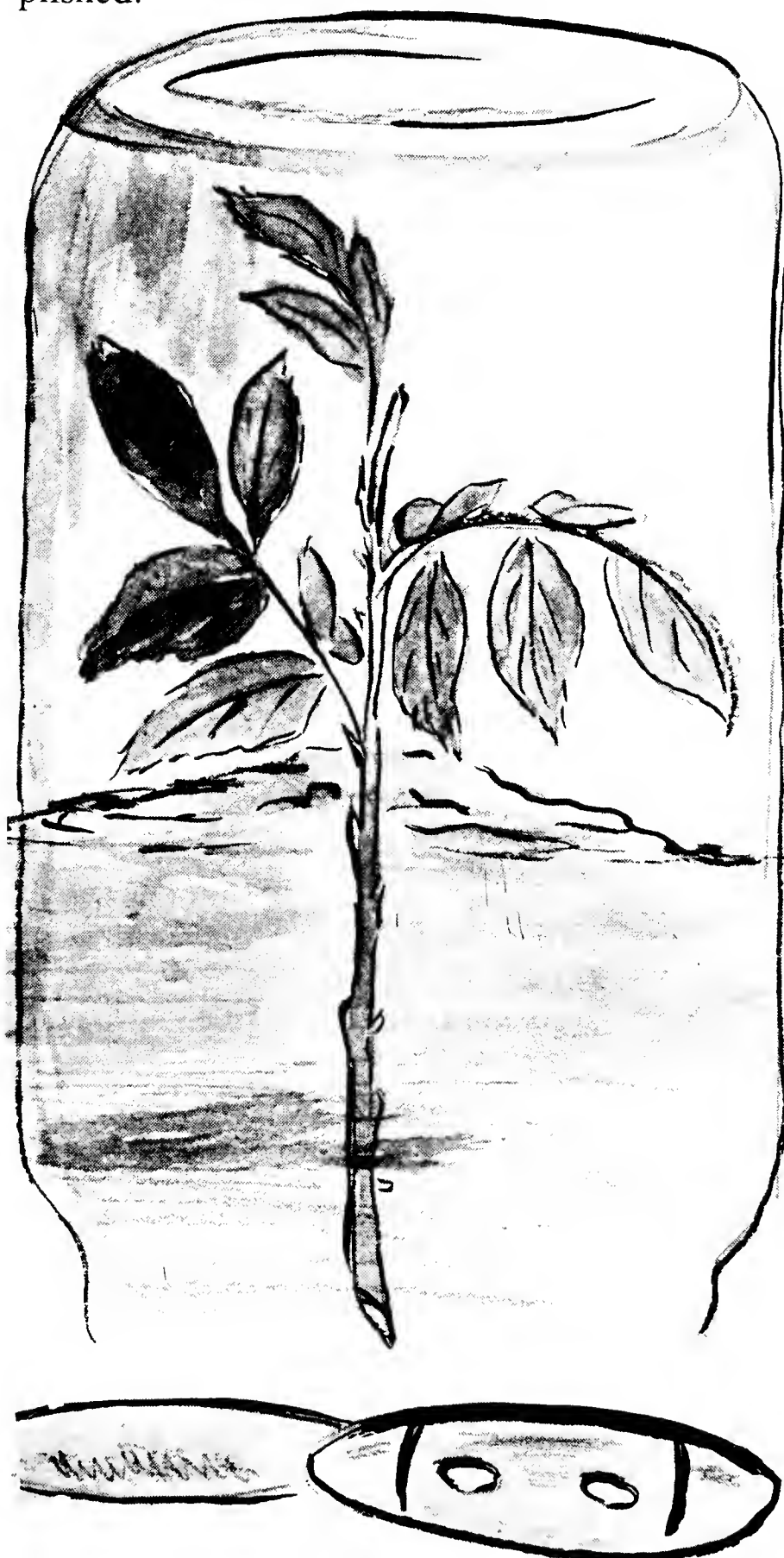
Steps for taking cuttings:

1. Prepare the ground as you would for planting bare-root roses. We generally dig a trench 30 inches deep and in this we place 8 to 10 inches of compost. Cover the compost with good soil and thoroughly water it so that it is well settled.

2. Have all the containers ready. Quart or half-gallon glass jars are adequate for most cuttings. Pint jars are fine for the easy-to-root cuttings of miniature roses. Thoroughly moisten the inside of the jar, empty the excess water and immediately put dirt or dust into the jar. Be sure it is well darkened. Some dirt will sweat off later, if so, re-muddy the jar or the cutting will burn.
3. Select the cutting from a stem that has bloomed and from which the petals have fallen. This indicates a well-hardened stem.
4. Cut the cane below the fifth or sixth set of five leaflets. Remove the three lower sets of leaflets. This lower part of the cane will be in the soil. The remainder of the leaves should be left on the stem. Cut off the blossom head just above the top leaf. Use a razor blade to make a slanting cut about $\frac{1}{4}$ inch below the bottom leaf bud. Dip the stem in water to moisten it, dip it in a rooting hormone, such as Rootone, then shake off the surplus. This rooting hormone is important.
5. Make a hole with the trowel handle and insert the cutting three leaf buds below the surface of the soil. Place a jar over the cutting and press it into the soil so it will be firm and not tip over.
6. Water thoroughly.
7. Do not remove the jar until the first week in May. Even then there must be some protection given the cutting. A half-gallon milk carton, cut diagonally and put around the cutting so it is shielded from the south, east and west, will afford adequate protection. Leave these cartons on until the cutting grows out and above them. Do not allow

cuttings to bloom before the last part of July. The energy required for blooming is needed for the formation of a strong root system. Cuttings should be checked during the winter as they must be kept damp all winter long. Loss of cuttings is usually attributed to drying during the winter.

Roses grown from cuttings are generally somewhat more intense in color and often have considerably better shape than grafted roses. If you try cuttings once, you will be enthusiastic especially if good results are accomplished.



EXOTICS of Colorado...

The Honey Locust

HELEN MARSH ZEINER

WITH THE development and introduction of the thornless honey locust, *Gleditsia triacanthos inermis*, this tree has become an increasingly popular shade tree in Colorado. It is an approved shade tree for the central and southern plains.

While exotic to Colorado, honey locust is a native tree in the Appalachian mountains and Mississippi valley regions, and is naturalized in other parts of the eastern half of the United States.

Honey locust is by nature a medium-sized to large tree with long, narrow, scaly ridges of dark bark. The leaves are once or twice divided (pinnately compound), about 4 to 8 inches long, with numerous very small leaflets. The foliage has a light, lacy appearance, and casts a light shade. It is not difficult to grow grass under the shade of these trees. The leaves turn bright yellow in the autumn.

The flowers are small and inconspicuous, rather greenish in color, and in narrow clusters about 2 inches long. They are rich in nectar and attract bees.

The large pods are very characteristic. They may be as much as 12 to 18

inches long and are about an inch wide. They are flat and usually slightly curved and twisted. The color is dark brown to purplish brown. They show the relationships of this tree which is a member of the pea family, for they look like large bean pods.

To some persons the dropped pods will be a nuisance, but flower arrangers will find various uses for them in dried arrangements.

Large, stout, branched thorns occurring on the trunk and branches characterize the species. Anyone who has seen an old honey locust with the trunk well-armed with these vicious thorns can never forget this tree. Occasionally thornless trees are found in nature. By selection and breeding, the thornless variety has been developed to the point that it is readily available in nurseries. While it is a much more desirable tree for home planting, perhaps it is not as interesting as the thorny honey locust.

The thorns of honey locust are of interest from a botanical standpoint, since they are peculiar modified stems or branches. On an old tree, they will often bear fully developed leaves.

Honey locust has proved itself to be



drought resistant and frost hardy. It grows well in most kind of soils, although it prefers deep, rich loam. It can be expected to live 40-50 years.

This is one of the last trees to leaf-out in the spring, and one of the first to lose its leaves in the autumn, but this disadvantage is offset by its ability to stand abuse once it is established.

Honey locust trees have many interesting uses. Bees gather nectar and make much honey from the flowers. The pods are eaten and relished by livestock and wildlife. The wood is used for fence posts, construction, and railroad ties. Since the wood of old trees takes a beautiful polish, it is used in furniture making. The trees are used for shelterbelts and shade trees.

These trees line parts of University Boulevard near Bonnie Brae and parts

of Buchtel Avenue east of University Boulevard. They will soon be conspicuous by their brilliant yellow color.

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Mrs. Robin Long

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WEEDS

Nothing BUT In My Garden

WES WOODWARD

IT ALWAYS STARTS with the marigolds. Every year a visitor frowns when he or she sees that orange-bright patch, and then, confidentially, advises me that "those are weeds. I wouldn't have them in my yard."

All right. All right! So they're weeds. But to this untutored slob, they're beautiful. What's more, they're old friends. I planted their ancestors 15 years ago and I wouldn't be without their companionship.

Other cultured aesthetes point out the hollyhocks. "You don't want those weeds. They're dirty. They bring rats!" I don't know. I never noticed the dirt or the rats, but I always feel comfortable with the ruffled primness of the hollyhocks in the shadow of the apple tree.

Yesterday, my neighbor, raking up his lawn, nodded toward the clump of rose locust on my side of the fence. "You ought to get rid of them sumacs," he said, "they're weeds." I remonstrated: "Those are locust, they have pink flowers in the..." "No," he told me, "that's sumac. It grows all over Iowa. It's no good. It stinks."

This was a double blow to my modest garden, for it condemned the locusts that he was looking at and also the stately sumac in the corner — which he didn't recognize. Get rid of those

weeds? Give up the pink cloud of one and the autumn glory of the other? No! I won't do it.

The iris get their share of the derogatory remarks. "Why do you keep those old flags around? They're no good." "But," I say, "I think iris are about the most beautiful things in this world." This defense of mine only gets an impatient sniff and a pitying look. Plainly, to others, iris are weeds. To me, they have all the splendor of orchids, with a touch of plainness, like good people.

The list of weeds in my garden is long. The dogwood is worthless — to the lady from Missouri. The day lilies are "cornflowers — I wouldn't have them," to another neighbor. Phlox are too common for some, and myrtle is repulsive to others.

It is sad that after a lifetime of growing flowers I have not developed any discrimination. Clearly I am not one of the chosen who appreciate the finer things of life. I guess it's too late to learn; I still like weeds.

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We Need YOU!

Up to this time the Denver Botanic Gardens has operated with only a limited number of volunteers to assist the four staff members and three maintenance men. With the opening of the conservatory and operating greenhouses scheduled for next year, it has become obvious that a large organization is needed to cope with the increasing activities.

Therefore, a **new volunteer organization — Associates of Denver Botanic Gardens — is being formed.** Membership will be open to any man or woman who is interested in the Gardens and wishes to help. Dependable workers are needed for the following activities: 1) to groom the plantings in the Gardens, 2) to guide tours through the various units of the Gardens, 3) to act as hostesses in the House, 4) to assist in the Library, Herbarium, and proposed gift shop, 5) to help with educational programs, 6) to help with stenographic and clerical work, labeling, mapping, and flower arrangements. More information can be obtained at Botanic Gardens House — or you can phone for registration or fill out the membership blank on the following page. Temporary co-managers of the Associates are Mrs. Graham Morrison (424-0706) and Mrs. Chard Smith, Jr. (756-1327).

ASSOCIATES OF DENVER BOTANIC GARDENS
MEMBERSHIP FORM

Name_____

Address_____

Telephone_____

Date_____

Member Denver Botanic Gardens?_____

Garden Club Affiliations?_____

INTERESTS

_____Annual Garden Tour

_____Gift Shop

_____Annual Plant Sale

_____Library

_____B G House (underline)

_____Mapping

hostess

_____Promotion

sewing

_____Others (indicate ideas)

repair

office work

flower arrangements

_____Garden Maintenance

_____Guide Tours of (underline)

York Street Gardens

Rose Garden City Park

Trees City Park

Alpine Trail

SKILLS

Please tell us a bit of your background; any degrees, special skills, ordinary skills, or whatever brings you to Associates.

Signature

Mail to: Associates of Denver Botanic Gardens
909 York St., Denver 80206

Denver Botanic Gardens

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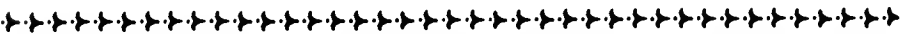
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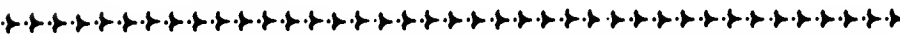
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THE COVER

American elm in fall color.
Photograph courtesy of George H. Harvey, Jr.



Winter Protection of Plants

DR. A. C. HILDRETH

Director, Denver Botanic Gardens

THE NEED FOR protecting our garden plants over winter means that we are growing species and cultivars that are not adapted to our climate. Man has always tried to extend plants beyond their natural climatic limits and he usually gets into trouble by so doing. Ordinarily he suffers disappointments and periodic losses or else he makes a considerable effort to provide artificial winter protection.

Installing various protective devices in the fall and removing them in spring can become a tiresome chore, particularly if many tender plants are involved.

Furthermore, the effect produced by various methods of bundling up plants for winter is anything but attractive. To the normal drab appearance of a temperate zone garden in winter we add discordant elements such as mounds, coverings, wrappings and temporary screens, none of which were included in the landscape plan. And in a short growing-season climate

such as ours, we must look at these unattractive additions for the greater part of the year!

In regions of continuous winter snow-cover, most such protective features are hidden for several months by a snow blanket. Our bright winter sun and our Chinook winds, however, usually make short work of our snow, leaving our gardens bare most of the time and all eyesores clearly visible.

No other part of the United States having such cold winters as ours, offers so much opportunity for enjoying gardens in winter. With no snow under foot and often with hours of warm sunshine overhead, we can wander among the plantings in comfort, admiring gorgeous evergreens, the lingering fruits of buckthorn and cotoneaster, the bark color and texture of many trees and shrubs, the glossy branches of birches and the varicolored leaves of hardy perennials.

But our enjoyment of a garden in winter condition is greatly reduced if



Mahonia aquifolium (Oregon grape) protected by a heavy snow cover.

too many of our plants are packaged as though waiting for the moving van or bandaged like patients in the emergency ward of a hospital. For the saving of labor and expense, as well as for the appearance of the garden during the dormant period, we should aim to have the minimum of artificial winter protection.

The most satisfactory means of avoiding unattractive protective devices is to plant only those trees, shrubs, vines and herbaceous perennials that have their own "built-in" winter protection—in other words, those that are thoroughly hardy in our climate.

Many people, however, are unwilling to limit their plantings to species of ironclad hardiness. In fact, most of our gardeners take the trouble to grow choice kinds of plants that cannot stand exposure to all the rigors of our winters. Fortunately there are several possibilities for growing somewhat tender plants in our gardens without risk

and without marring the landscape by unsightly means of protection.

For example, several evergreens such as yews, Korean boxwood, English ivy, dwarf Alberta spruce, chamaecyparis, various evergreen euonymus and several types of arborvitae cannot tolerate our winter sunshine but are otherwise adapted to our conditions. By planting them on the north side of

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a house or wall we can enjoy these sensitive but highly ornamental plants with no bother at all.

Modern homes frequently have sheltered corners or recesses where shrubs or small trees of doubtful hardiness can be planted. Protected from winds and often with the walls of a heated house on two sides and perhaps an overhanging eave, the plants are never exposed to such cold temperatures as

the Weather Bureau records. In such places a flowering dogwood, pyracantha, flowering peach, deciduous magnolia or even an azalea may survive our severest winters.

If no such sheltered nooks are available, the most favored place for trees and shrubs that are on the borderline of hardiness is the east side of a house, near the wall. Tender vines such as certain climbing roses and species of clematis that would not survive on a fence or exposed trellis may do well on the wall of a heated house.

Some winter hardy plants break their rest period early in winter and are ready to grow whenever temperatures are favorable. For such plants the best winter protection is not shelter but more exposure to low temperature.

Gardeners who plant "Dutch bulbs" on the south side of the house and near a warm basement wall often find the plants coming up in mid-winter, when they are certain to be damaged by later sub-zero weather. Other hardy

perennials and some early flowering shrubs may suffer similar injury in a location that is prematurely too warm. Planting in a more exposed location away from the warm basement will retard their activities until spring.

Much can be done to help plants endure winter by cultural practices. In order to develop their fullest degree of cold tolerance it is necessary that plants retain their foliage in good condition until it reaches full maturity. Plants, the leaves of which are destroyed or badly damaged by insects or disease, rendered non-functional by iron-deficiency chlorosis or shed prematurely because of drought, cannot

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develop their normal degree of hardiness. Also hardy perennials which have all or most of their foliage pruned off before it naturally matures are likely to succumb to the winter.

Late additions of fertilizer, especially if followed by heavy watering, may stimulate woody plants into late growth which does not have time for normal hardening off before severe cold strikes. In our climate such plants should not be fertilized, particularly with high nitrogen fertilizers, after the middle of August.

Plants differ in their tendency to slow down activities in late summer and to undergo the hardening process in preparation for winter. Trees and shrubs with indeterminate growth habit, such as the Russian olive and Siberian elm, continue growth as long as water, nutrients and suitable temperatures are available. Others such as ash, lilac and cottonwood set their terminal buds and drop their leaves



Leaves of tulip emerging from the snow during the early spring.



Snow cover on conifers in City Park. Heavy snow loads may cause breakage of branches if not removed.

early, regardless of high nutrient conditions or abundant water supply.

To make certain that all deciduous trees and shrubs develop their full degree of hardiness it is best to start tapering off the water supply in late summer.

In our semi-arid climate we are concerned not only with winter protection from wind, sun and low temperature but also from drought. Exposed to our bright sunshine and dry atmosphere, our plants lose moisture in winter as well as in summer and may suffer drought injury, especially in years of less than normal precipitation.

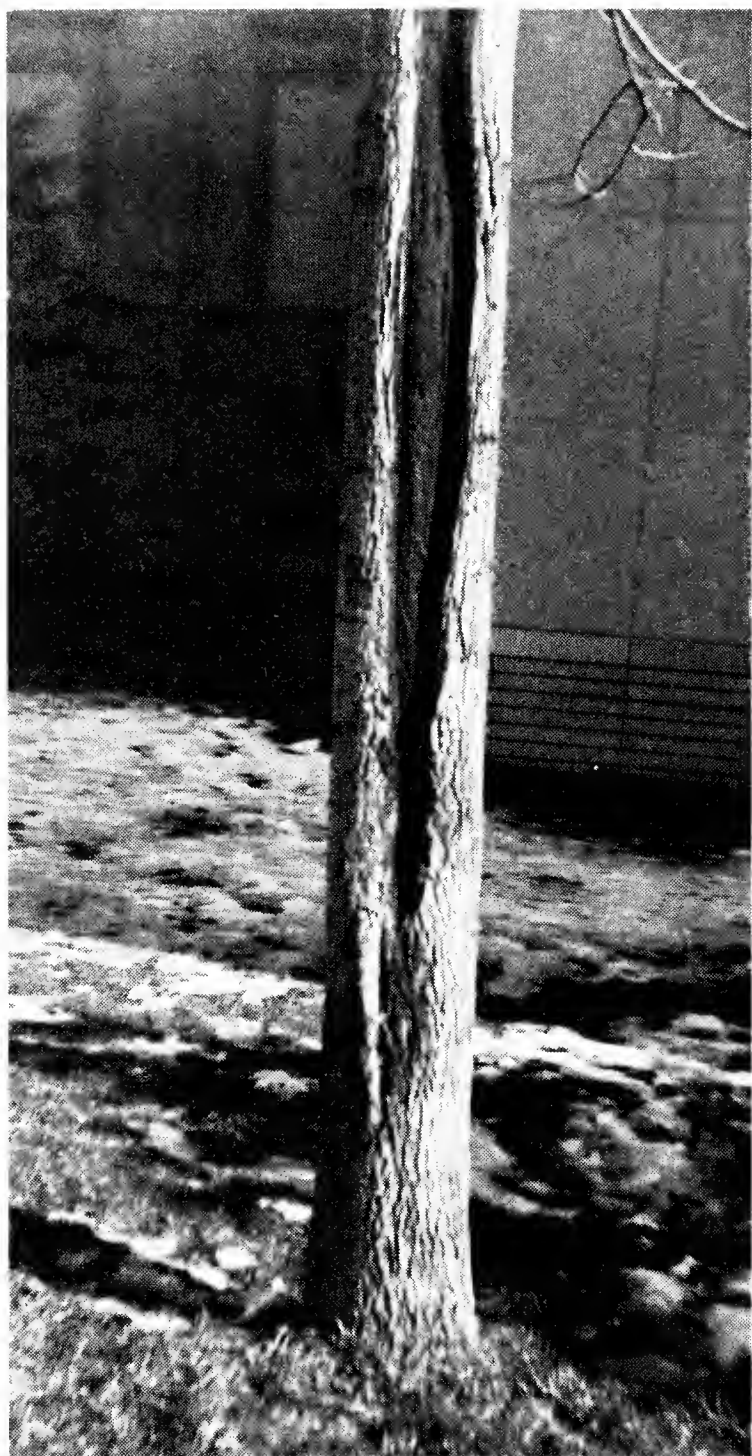
Most susceptible to such drought injury are evergreen trees, shrubs and vines which carry their full foliage all winter; recently planted woody plants which have not yet developed root systems sufficient to pick up needed moisture from a moisture-deficient soil; birch trees which require more winter

moisture than most deciduous trees; and herbaceous perennials that have shallow root systems or evergreen foliage.

To protect against winter drought, water all trees, shrubs, vines and herbaceous perennials (including lawn grass) in late fall. Take time to thoroughly soak the soil as deeply as the roots penetrate. Repeat such waterings occasionally during warm periods in winter and early spring.

After we have exhausted all possibilities of selection, location, preconditioning and winter irrigation as means of avoiding artificial winter protection we usually find some plants that require some sort of protective covering.

Chief among these are trees subject to winter sunscald. Most susceptible are mountain ash, linden, redbud, maple and cherry, although several other shade and ornamental trees and most kinds of fruit trees occasionally



Injury to the trunk of American linden caused by winter sunscald.

suffer such injury. Young trees are more susceptible than old trees and species with smooth bark are more susceptible than rough barked ones.

This injury occurs as dead areas of bark on the southwest side of tree trunks. It is associated with the low-angled winter sun that strikes exposed trunks in the afternoon. The precise mechanism by which sunshine causes this injury is in dispute among plant physiologists but the remedy is well known. It consists simply of protecting the trunks from the afternoon sun in winter. This is now done by wrapping the trunks with strips of a special tree-

wrapping paper, available from most dealers in garden supplies.

So far as winter sunscald is concerned this wrapping can be put on in early winter, before severely cold weather and removed in spring. Professional arborists, however, frequently wrap all trees after planting and leave the wrapping on the year around for several years. This not only prevents winter sunscald but also cuts down water loss from the trunks and reduces damage to the bark by children and small animals.

In our climate it is advisable to cover all or part of the stems of certain woody plants over winter. Our bedding roses—hybrid teas, grandifloras and floribundas—are examples of plants that need such treatment. Covering not only insures survival of the plants but also increases the number and perhaps improves the quality of the early summer flowers.

The canes are usually protected to a height of 8 to 12 inches. The best material for covering is top soil, which is mounded around the bases of the plants to the desired height. The mounds are made in early November and removed in early May. (See also *The Green Thumb*, October 1963.)

Raspberry bushes in our region are usually killed to the ground during winter unless protected. To save the canes that will bear next year's crop it is necessary to cover them completely. Again soil is the best covering. The canes are simply bent down to the ground and covered with soil. In spring the canes are straightened up and the soil used for covering is removed.

Any tender shrub, small tree or woody vine can be wintered successfully in this way. For trees and tall shrubs that are to be laid down each year it is customary to train the roots

so that they are all on one side. This facilitates leaning the tops over for covering.

Mulching is a time-honored method of protecting plants over winter. Various materials, such as straw, hay, leaves, peat, leafmold, wood shavings, sawdust and manure, have been used. A substantial layer is spread over perennials and over the roots and around the bases of shrubs and trees in fall. This material is either removed in spring or worked into the soil to improve its physical condition.

Benefits claimed from such protection include preventing of damage to plants from heaving, from too low soil temperatures and from alternate freezing and thawing, delaying growth in spring until severe cold is past and keeping the soil from drying out.

Experimental work on mulching in the Great Plains region has been very limited. The meager results indicate, however, that in our dry winters and under our bright winter sunshine, protective mulches may behave differently than they do in humid climates. In fact there is often a question as to whether the mulch is beneficial, ineffective or detrimental. Certainly many plants for which a winter mulch is recommended in the northeastern part of the United States do not need such protection in our area.

First of all, heaving is not a common type of winter damage under semi-arid conditions. Also in our dry winters the mulch is likely to become dry and may even act as a blotter, taking

moisture from the plants and soil instead of keeping them moist. The light rains and snows that fall in winter and early spring may remain on or in the mulch, from which the moisture evaporates without reaching the plants or the soil.

Mulches of peat, leafmold and manure are usually darker in color than our soils. The dark surface absorbs more heat from the sun than would the lighter colored soil. This may be sufficient to start the mulched plants into premature spring growth.

We must conclude that winter mulching of our garden plants is generally unnecessary. Only for the few tender plants that some gardeners grow (mostly herbaceous perennials) is such a mulch needed. It should be applied in late fall. It is advisable to remove the mulch in early spring to prevent premature forcing of growth, particularly if the mulch is dark in color and the mulched area is exposed to full sun. It is mainly the severe cold of December, January and February that we need to guard against.

If a loose mulch material is used, such as straw, dry leaves or wood shavings, it may be advisable to water the mulched area a few times during winter to keep the soil moist. A continuous wet, soggy condition of the soil beneath the mulch, however, should be avoided.

Plants that have bulbs, corms, tubers or rhizomes should not be mulched with manure, because of the danger of inducing disease.

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Some Notes on **GROUND COVERS**

FRANCES NOVITT

Landscape Architect

Denver Department of Parks and Recreation

IN THE MINDS OF MANY landscape architects and gardeners in this region, one of the most important plant collections in the Denver Botanic Gardens is the Ground Cover Collection in the herbaceous unit at 909 York Street. There is a great and still unfilled need for low-growing plants which will take the place of grass as a ground cover. Many areas in such publicly used places as parks, parkways, highway right-of-ways, cemeteries, golf courses, surroundings of public buildings, as well as in private gardens, are not suitable for lawns.

Advantages and Disadvantages

There are other kinds of plants which are far better than grass for the purpose of covering the soil on steep rocky slopes, banks, in the dense shade of trees and buildings, narrow center strips of double-lane streets and highways, dry areas, areas where there is little foot traffic and, in general, any areas where grass is difficult to maintain.

Ground cover plants are low-growing perennials traditionally grown in the rock garden, subshrubs and low shrubs, vines and even low-spreading annuals that reseed themselves from

year to year. Some ground covers are evergreen, others are drought resistant, some can endure a limited amount of foot traffic. Many have extremely attractive flowers and all offer much to the designer and gardener with the varied color and texture of their foliage. They vary in height from 1 or 2 inches, to something over 2 feet and all tend to grow wider than high. Some grow slowly and some are vigorous, rapid growers. All types are useful in the right places. While a very small and refined plant would be at its best in a small garden area, a vigorous coarse grower would be needed to cover a long slope above a highway.

In our climate some of the typical characteristics are subject to qualification. Some plants classed as evergreen in other parts of the country are less likely to be so here. Our winter drought and burning winter sun often cause foliage to drop and winter-kill of the branches down to the soil level. Where it is possible to mulch these plants over the winter, the damage is reduced but whatever effect the evergreen foliage would contribute to the winter scene is covered by the mulch. Although the flowers of some ground cover plants are charming, the withered flower

stalks sometimes present a very messy appearance and should be removed. Over a large area this would involve quite a lot of work but on an area flat enough to mow, one can get around the problem by simply running the lawn mower over the whole planting; in most cases, the foliage is low enough or tough enough not to be damaged in the process. A good gardener usually removes all faded flowers and withered stalks from his flower beds anyway, in order to strengthen the plants by preventing them from going to seed.

Planting an area with ground cover plants does not mean that one can

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then forget it. It will have to be weeded by hand for the first season or two, until the plants are established and have covered the area. Obviously, one cannot use the broad-leaf weed killers suitable for lawns, as these will destroy the ground cover plants, too. Many ground covers grow so fast and so thickly that weeds cannot get a foothold after the first year or two.

Those varieties which grow rapidly have to be used with discretion and planted in an area where this characteristic is an asset and not a disadvantage.

Perennial ground covers require the same care as all other perennial plants, shrubs, vines and trees. The soil should be well prepared before planting and after they are planted and established

they must have sufficient water, especially in the winter; even dry-ground plants thrive better with an occasional watering throughout the year.

The Ground Cover Collection

The collection contains mostly sun-loving plants, since there is such a great need for them, particularly around homes in our new treeless, shadeless subdivisions. These plants are in full sun, summer and winter, with no benefit of mulch but, of course, watered in the winter when necessary. The collection was begun in the spring of 1962 and plants were added in subsequent planting seasons. The winter of 1962-63 was a severe test for the first plants in the collection, being one of the coldest and driest on record and the surviving plants have proved their hardiness beyond question. By the fall of 1963 many varieties were showing great promise. Unfortunately the collection had to be moved in the spring of 1964 to a place where various problems have prevented good growth, so that, temporarily, there is not much to be seen in the field.

The following list was made from notes taken by the writer and from a survey made by Roberta Sawin in September, 1963; this was the final survey

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made before the collection was moved. Many well-known ground covers are not listed here, since the aim was to test varieties not generally known to be hardy or suitable for the purpose. Only a fraction of the possibilities has been tested so far.

Some Good Ground Covers for Full Sun

Achillea tomentosa aurea. This species of achillea or yarrow and its varieties, makes fine ground covers. The plants form low tough mats of finely textured ferny foliage, evergreen to a good extent in our climate; they do well in average soil and in hot, dry places. The foliage is not much over 4 or 5 inches high and the flowers are yellow in this variety, with stalks about 7 inches high. The dried stalks can be mowed with a lawn mower and the plant grows thicker and thicker. It can survive a moderate amount of walking.

Achillea umbellata is like the above, except that the foliage is blue-green

and the flowers are white. They both were planted in the spring, 1963, developed very well the first season and survived the relatively mild winter of 1963-64.

Ajuga 'Gaiety'. Many of the ajugas or bugles, are among the best ground cover plants. This one seems promising. Planted in the spring, 1963, it has attractive bronze-green, broad leaves in a tuft-like arrangement and the typical vigorous growth and spread of the ajugas.

Antennaria spp. The pussy toes or cat's paw, native to our mountains, is not unknown as a good ground cover but deserves to be far more widely used. The leaves of all species are very tiny, silvery gray or silvery green and the plants form a flat, tight mat 1 to 2 inches high. They spread well and make a neat silvery carpet which endures a moderate amount of walking. The blossoms (the "pussy toes") are charming in the bud stage, being white,

Antennaria sp.





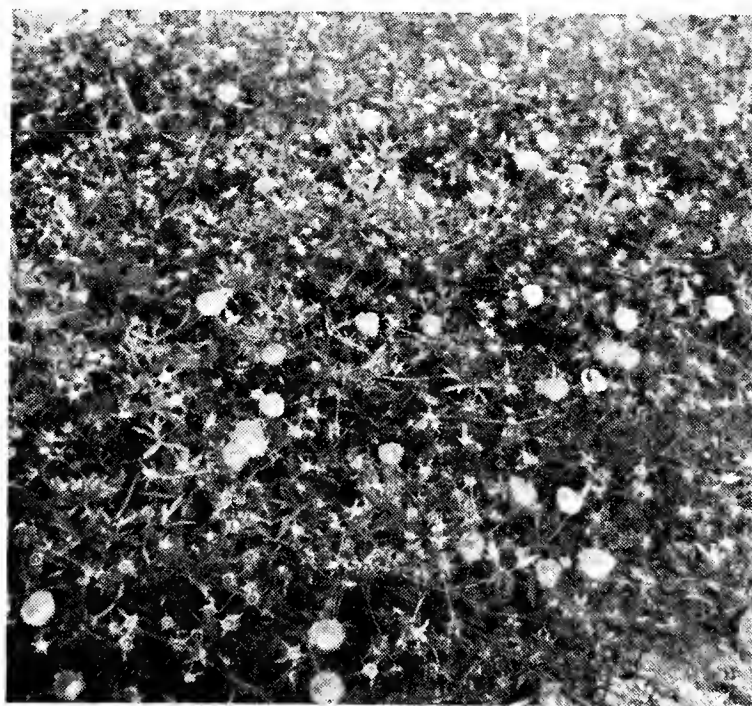
Antennaria sp.

pink or even red. The flower stems grow up to 10 inches long down in the altitude of Denver and should be cut off with the lawn mower or clippers when they start to lengthen.

If a few flowers are spared in one corner of the planting and are allowed to go to seed, they will provide great quantities of seeds which germinate very rapidly, especially when fresh. Home gardeners can also collect seed from plants in the mountains and grow their own ground cover. Seeds should be sown in moist soil, which should then be covered with a sheet of plastic to prevent it from drying out and then set in a partly shaded spot in the garden until germination begins. The seedlings will start coming up in a few days, when the plastic should be removed and the flat not allowed to dry out. In a month or so it will be thick with seedlings which can then be set

out by the spoonful in the garden. All species are, of course, absolutely hardy.

Artemisia stelleriana, beach wormwood, old woman or dusty miller. This was planted in the spring, 1963 and spread over 12 inches in one season. The foliage is about 6 inches high and



Callirhoe involucrata



Eriogonum sp.

an attractive silvery gray color, forming a flat mound.

Callirhoe involucrata. The poppy-mallow or wine-cup, is native from Minnesota to Texas and Mexico and shows great promise here as a coarse, colorful ground cover on highway banks and other large dry areas. It grows into a continuous loose mat about 8 inches high, each plant spreading several feet from the center; it is covered with showy wine-pink flowers for most of the summer. It is hardy and seeds itself prolifically in congenial soil.

Cerastium alpinum lanatum. This woolly member of the chickweeds seems promising for small areas, since it seems to grow slower than *C. tomentosum*: to about 3 inches high and 7 to 8 inches in diameter at the end of the first growing season. It has white flowers in May; the stalks are not tall or unsightly.

Eriogonum spp. The beautiful sul-

phur-flower (*E. umbellatum*) and other members of the genus are natives of our mountains and very attractive additions to ornamental horticulture. The plants in the Ground Cover Collection do not seem to have thrived as well as those in the garden of the author. They are probably *E. umbellatum* in both places, which produces chartreuse-yellow flowers in early June, lasting over a long period of time. The plants in the Botanic Gardens were collected; those in the private garden were grown from seed collected and sown in the manner described under *Antennaria*. It is hard to say whether this indicates that plants grown from seed and set out when small produce better results than large clumps collected from the mountains. Certainly they are easy to raise from seed and will bloom the first season. The effect of the flowers lasts a long time because they more or less dry out on the stem, keeping much of their color and making good ma-

terial for winter bouquets. The gray-green leathery leaves form low mounds which turn reddish in the winter. The plant grows rather slowly and the short branches become rather woody with age. Flowers to be dried should be picked at their prime and hung upside down to dry, the others should be removed with grass clippers when they begin to look brown and rusty, before they go to seed. All species are perfectly hardy. Here in Denver they seem rather inclined to chlorosis and probably need good, well-drained soil with some humus.

Gypsophila repens rosea. Creeping baby's breath. This has narrow green leaves and makes 6-inch mounds of dense foliage, with small purplish flowers borne above them to about 7 inches. It is an attractive plant in both foliage and bloom and seems to thrive well. It spreads fairly well, having increased its diameter from 3 to 20 inches over the summer of 1963, its first season.

It survived the winter of 1963-64.

Iberis sempervirens. Hardy candy-tuft. This is really a small evergreen shrub. It was planted in spring, 1963 and grew well the following summer, making a dense, dark green little shrub about 6 inches high and 10 inches wide. It survived the winter of 1963-64 and was transplanted into another area where it is progressing satisfactorily. The records do not show how long the leaves stayed on through the winter but it is surprising that it has done as well as it has out in the full sun.

Liriope spicata. Lily turf. This is much seen in the eastern and southeastern part of the United States as an edging and ground cover plant and it has proved fully hardy here, having come through the winter of 1962-63 in very good shape. It spread from 5 to 15 inches in diameter and from 6 to 12 inches in height in the summer of 1963, forming 12-inch by 15-inch clumps. Its very narrow leaves give it

Eriogonum sp.



a grass-like appearance and the purplish flowers and purplish berries are inconspicuous. It would make an attractive ground cover for a small area or an excellent edging plant.

Lonicera japonica aureo-reticulata. Yellow-net honeysuckle vine. This vigorously growing vine is not unknown as a ground cover. It spreads very rapidly and has a rather coarse appearance, to the point where it looks like a low shrub. The foliage is mottled with yellow and a large group of it makes a really bright area of color. It would be an excellent cover on large areas where its rapid growth and coarse texture would be advantageous. It seems to be very hardy.

Nepeta hederacea variegata. Variegated ground ivy. This is another rapid growing creeper which must be used in large areas or else firmly confined.

The plants are generally under a foot high and spread vigorously. Its green and white foliage makes it look like a light green, ruffled mat and it seems to be very hardy.

Ranunculus repens. Creeping buttercup. This makes a rich, dark, shiny green mat. After two growing seasons the plants were about 10 inches high and over 30 inches across. The small yellow flowers bloom in May and are borne about 7 inches high on inconspicuous seed stalks. The plants are very hardy.

Saponaria ocymoides. Soapwort. After one season these plants were about 8 inches high and made a fairly smooth, dark green, continuous mat. The low pink flowers are charming in May. Records on it are lacking after September, 1963.

Sedum album murale. Wall stone-



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crop. Many of the stonecrops are among the best ground cover plants available anywhere. They are generally very hardy, sturdy, drouth-loving, creeping and many are evergreen. However their succulent leaves do not withstand foot traffic. There is considerable confusion in the botanical names and some varieties are sold under several names, making it difficult to get the right ones. Wall stonecrop is one of several of which the growth habit and general appearance are quite similar. Except for its distinct reddish bronze foliage it is much like *S. calcareum*. Records do not disclose whether it is evergreen but this is likely since *S. album*, of which it is a variety, is evergreen. *Sedum album murale* is hardy, grows to a height of about 4 inches, has a fine texture and seems to have spread only a few inches per growing season. The flowers are pinkish; the dried flower stalks are ugly and should be clipped off.

Sedum calcareum. (This may have been mislabeled and probably is *S. album*.) This very hardy sedum maintains an even 4-inch height, has a rather fine texture and an excellent grass-green color the entire year. It is quite

similar to the preceding except for the different foliage color, taller white flowers and more rapid growth. The white flowers are quite effective for a short time in July but the old stalks are extremely messy and should be trimmed off. The growth is rapid enough so that although some of the tiny succulent leaves may be crushed by the wheels of a mower, they will be quickly replaced. This variety makes a very good ground cover.

Sedum ellacombianum. This is a somewhat tall (15 inches) but attractive variety, forming a continuous light

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green mat. The yellow flowers bloom in early July but their reddish, dried seed heads are not conspicuous and do not detract from their general appearance.

Sedum 'Fireglow'. The vegetative growth maintains a low 2 inches and appears to be slow spreading, having increased to about 15 inches in width over the summer of 1963. It is hardy and forms a good bronze mat, since the edges of the bright green leaves are tinged with red. The flowers are pinkish purple in July but their stalks should be removed.

Sedum 'Golden Carpet'. This is quite hardy, maintains a 5-inch height, spreads 4 to 5 inches in a season and forms a light green, rather flat, mound.

(Continued on Page 240)



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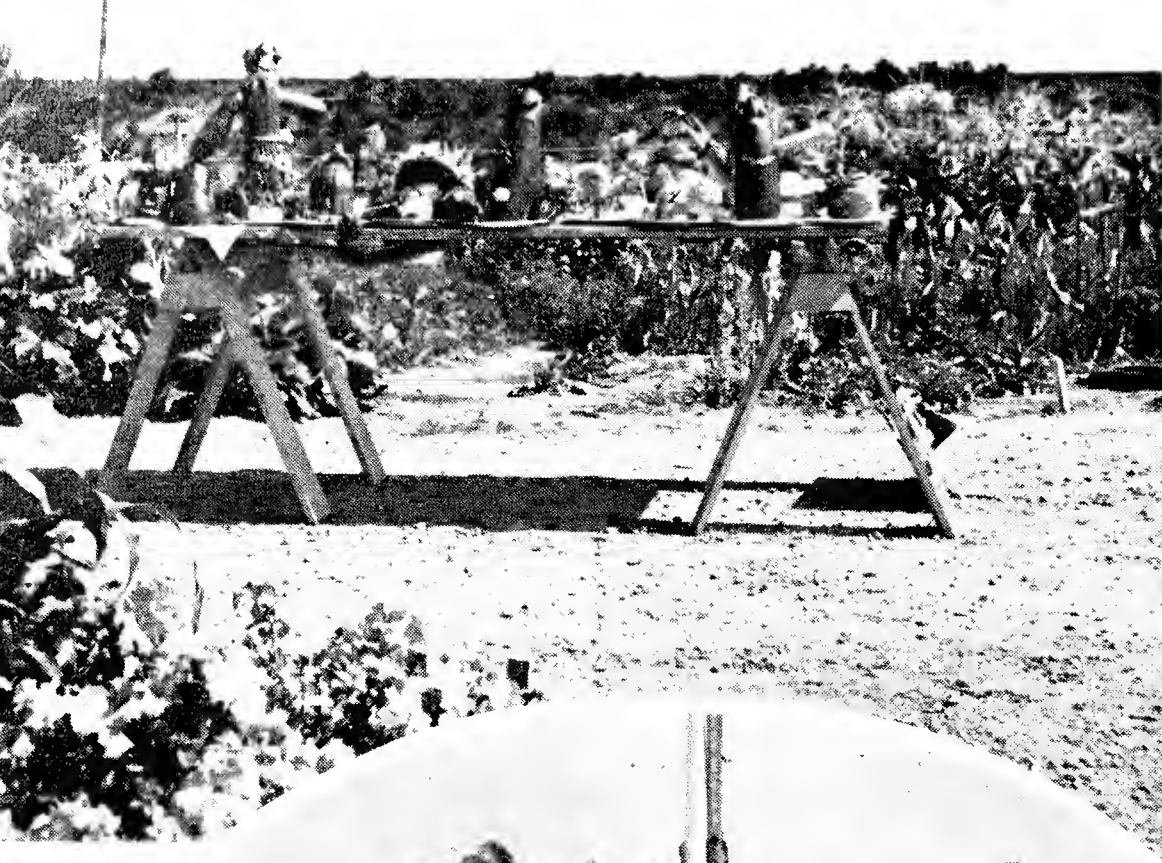
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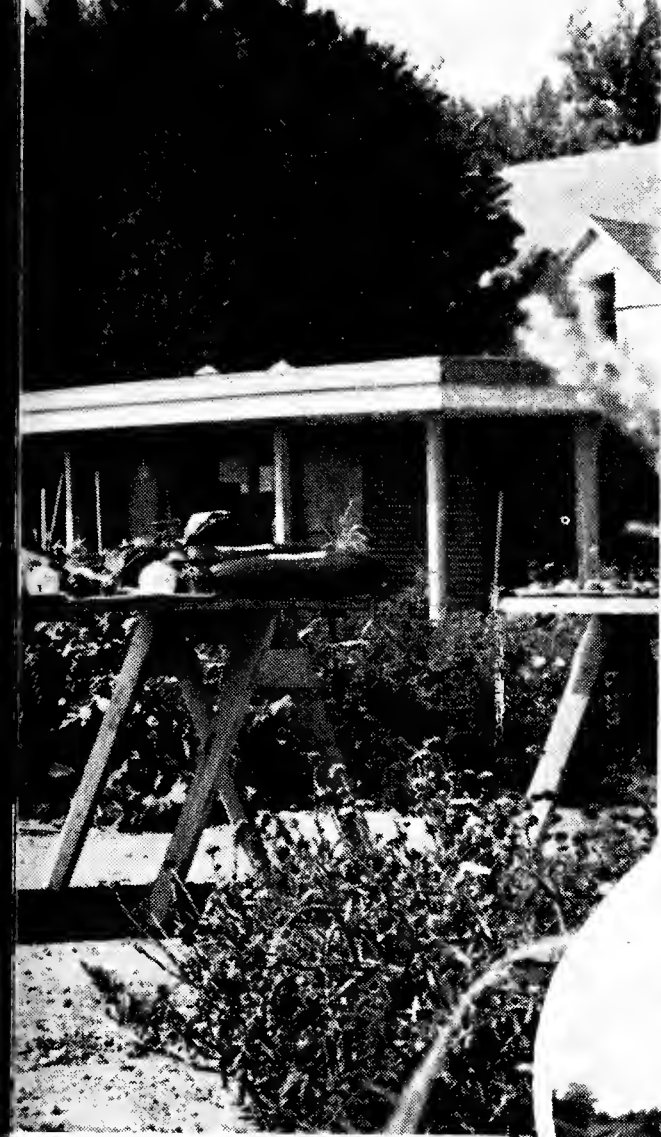
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Annual
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GRAD





Children's
FAIR
TION



(Continued from Page 237)

The leaves are light green with a white edge. There is no record of the flower color but seed heads are rather inconspicuous. It spreads slowly and well and would make a good ground cover.

Sedum hybridum. This is hardy, evergreen and maintains a 4-inch high,



Teucrium canadense

and maintains a 4-inch high, flat, handsome mat. The leaves are flat and in rosettes. The 6-inch high yellow flowers are very showy in April and May and their dead stalks are not too conspicuous. It spreads only moderately fast and makes a very attractive ground cover.

Sedum lidakense 'Rosy Carpet'. Over the first growing season this grew to 4 inches in height and to 10 inches in diameter and could be considered a slow spreader. It is a very attractive plant, with rosy edged gray leaves, flowers of deep rose-pink in summer,

leaving bright red seed pods which contribute to its charm.

Sedum lydium. This is hardy but extremely small, with tiny cone-shaped leaf clusters of very fine texture, having reddish green foliage all year. The tiny pinkish white flowers are insignificant and it is slow growing. It would be a good cover in small places.

Sedum pruinaum. The 6-inch high branches look like miniature branches of blue spruce, making an attractive, hardy, blue-green carpet. It is rather slow-spreading; there are no records of flowers but they are said to be straw colored, in summer.

Sedum rupestre minus. This is another sedum with branches looking like a miniature blue spruce. It increased from 2 to 4 inches in height and from 3 to 12 inches in spread in 1963. The yellow flower stalks appear rather coarse. It is said to be evergreen and would make a rather attractive ground cover.

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Sedum sediforme. This also looks like a tiny blue spruce. It maintains a 5-inch height and spread from a diameter of 5 inches to 10 and 22 inches, in 1963. The yellow flowers leave gross heads which should be removed. Records are lacking after September, 1963.

Sedum sexangulare. This hardy light green stonecrop forms a continuous mat about 3 or 4 inches high. The branches are much longer but are prostrate and all head in the same direction. This characteristic might make it a very interesting ground cover for hillsides or small slope areas. It is said to be evergreen; the leaves are $\frac{1}{4}$ inch long, in six spiral rows. The summer blooming flowers are said to be yellow.

Sedum stoloniferum. This maintains a $1\frac{1}{2}$ -inch height and it spread from 3 to 12 inches over the 1963 growing season. The stems are prostrate and the rounded leaves give it a fine texture. The star-like pink flowers in late summer are not especially attractive. Although later records are lacking, this would probably make an attractive ground cover.

Teucrium canadense. American germander. During the growing season in 1963, these plants increased from 5 to 9 inches in height and spread from 8 to 20 inches, forming a clump diameter of 18 to 20 inches. They are hardy and would make an interesting dark green rather clumpy ground cover. The small orchid-pink flowers appear in July along a 5-inch stalk.

Veronica allionii. This member of the speedwells forms a good hardy flat green mat about $1\frac{1}{2}$ inches high. It spread from 1 foot in diameter to 2 feet during the summer of 1963. The tiny, dark blue flowers are about 6 inches high in May.

Veronica gentianoides. This attractive hardy plant has broad leaves 5 or

more inches long and forms a compact tight cover about 6 or 7 inches high. The plants grew from 8 to 15 inches in diameter during the summer of 1963. The light blue flowers grow on stalks to 18 inches in early summer and should be removed when through blooming. It would make an attractive ground cover.

Veronica officinalis. This forms a good 2-inch high medium green mat. It survived the cold winter of 1962-63 in rather poor condition and made very good growth the subsequent summer, spreading from a diameter of 6 inches to 24 inches. Later records are lacking. The light blue flowers are borne on stalks 3 to 4 inches high in May. It would seem to be a very promising subject.

Verbena prostrata (*V. rupestris*) makes an excellent ground cover. It maintains a 3-inch height and spreads together to form a continuous flat medium green mat. In May the flowers, which are borne on 6-inch high stalks, transform it into a beautiful deep blue carpet. It is quite hardy.

There are many other plants we could discuss if there were space. Some kinds show great promise but there has not been enough time to give them a fair trial. In the years to come, continuous experiments in the Ground Cover Collection will add to the list.

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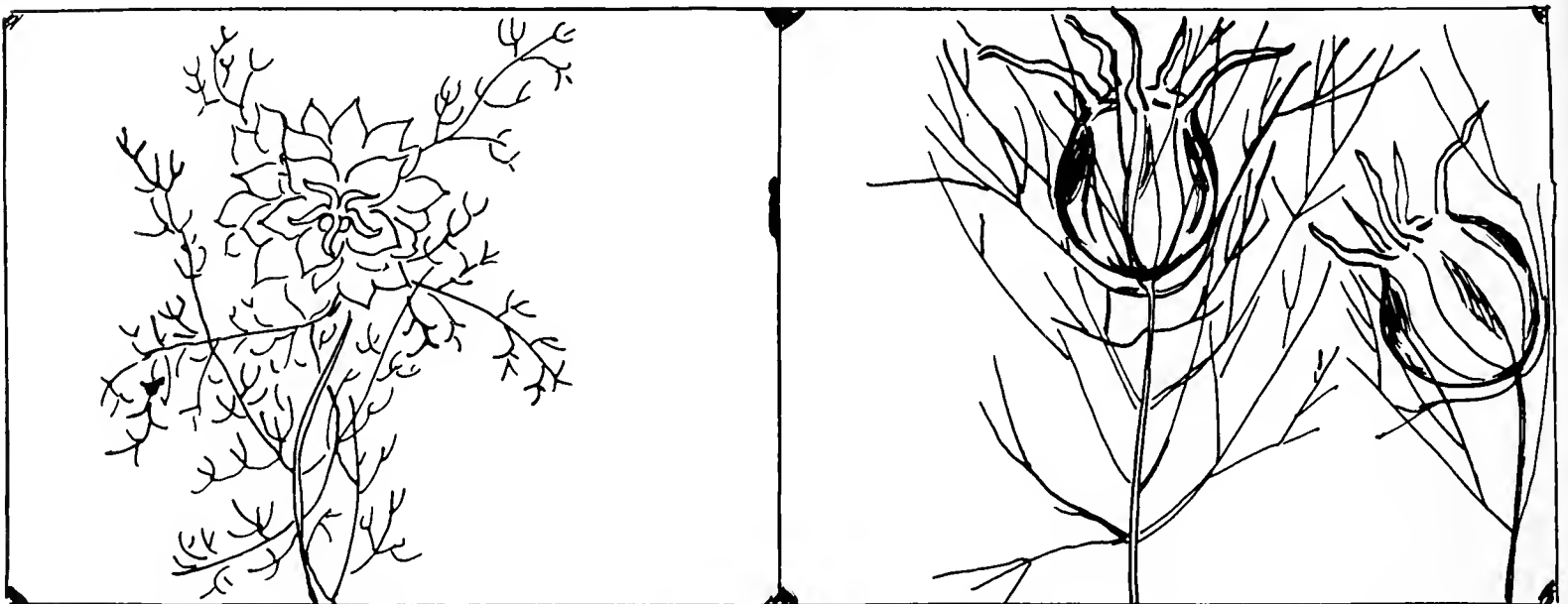
CLOWNS

MARIE S. ALKIRE

Now it is autumn and gardening draws to a close. Flowers are repaying me for my work with a final burst of color. The vegetable harvest has been bounteous. The fruit trees bring a bonus gift of plums, peaches and apples after their initial offering of blossoms and perfume last spring. The garden is ready to rest and so am I.

And now come the "Garden Clowns". You must look carefully, as their antics are not for the casual observer.

Plate A



Love In A Mist

Devil In A Bush

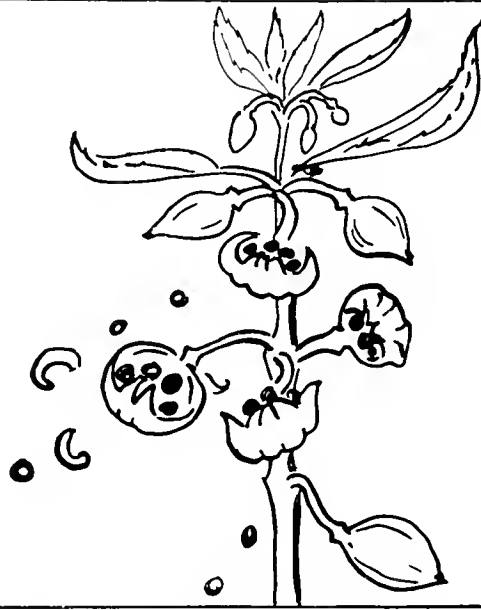
First, meet the "Devil In A Bush". He looks truly demoniac, peering out of a thorny thicket, his head a purplish brown, horns sticking out menacingly. Would you believe this is the seed pod of the clear blue flower hiding in soft ferny foliage, that we called "Love In A Mist" (Plate A)?

Or find the "Touch Me Not". In early summer it was lady's slipper, with dainty buds like tiny Cinderella shoes hanging on the stem. Following the showy red, pink and white flowers come thick oval seed pods. Touch the end of the pod and it pops open and becomes a six-fingered fist full of seeds which it throws so violently that its fingers often go, too (Plate B).

Plate B



Lady's Slippers



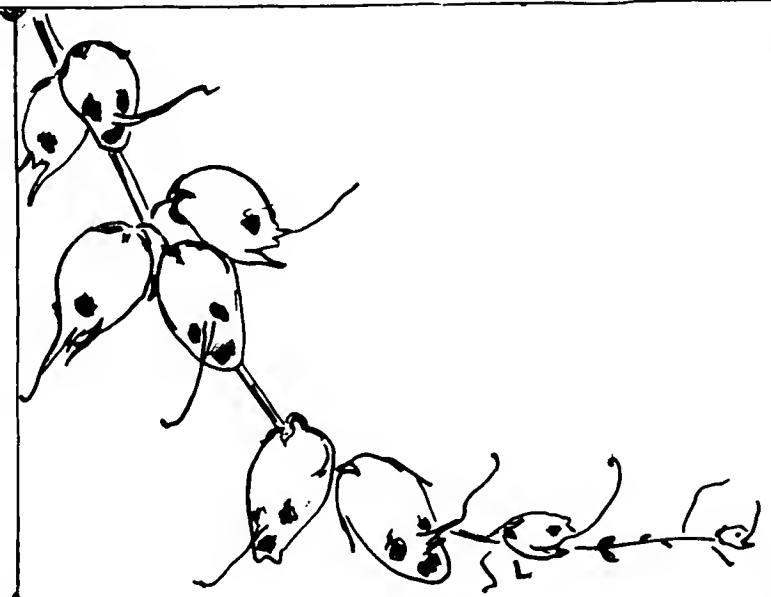
Touch Me Not

"Space Men" crawling along a stem are my favorite garden clowns. They are the seed pods of snapdragons, which were more or less clowning when in bloom, as each flower could be made to open and close its mouth realistically if you found the right pressure spots (Plate C)!

Plate C

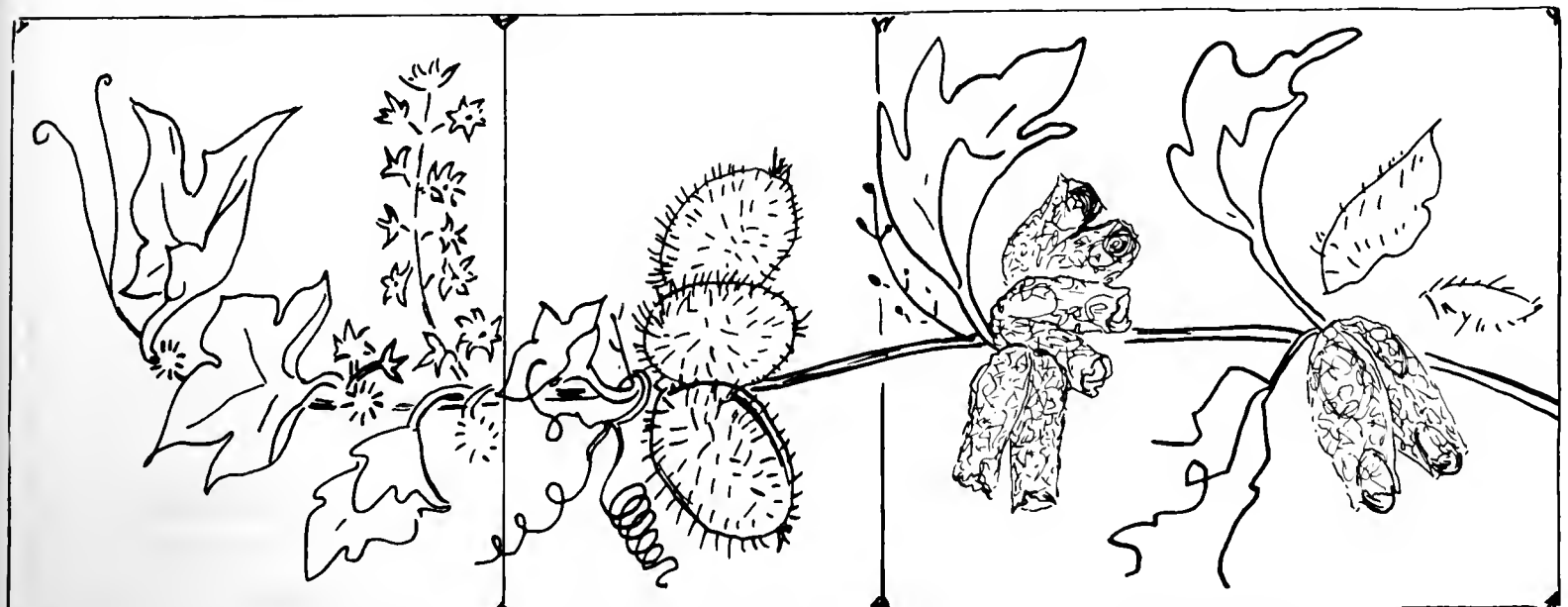


Dragon Mouths



Space Men

Plate D



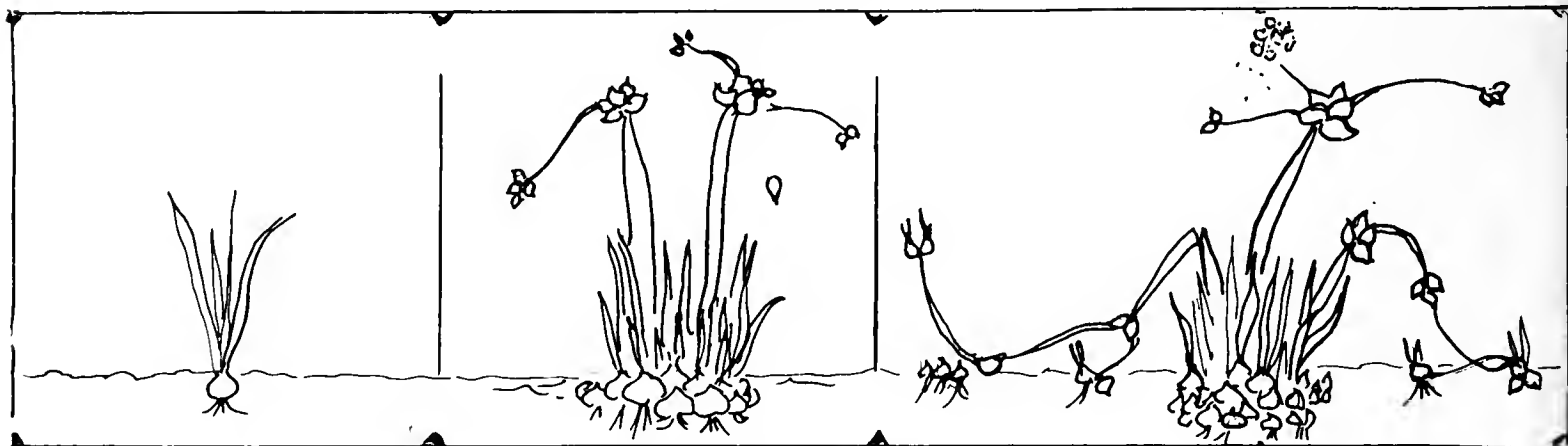
Wild Cucumber Vine

Porcupine Eggs

Lace Pants

The wild cucumber vine which grows on fences here and there, perfuming the air in summer, now puts on an amusing show. It is covered with spiny green pods which the children call "Porcupine Eggs". When the spiny cover is removed as they ripen, we find inside a perfect pair of dainty white lace pants holding the seeds (Plate D).

Plate E



Multiplier Onions

The original "computer" is the "Multiplier Onion" (Plate E). Plant a single bulb about as big as your finger nail. Result; a green onion. Or fail to use it and it goes to work multiplying in two ways. So many little bulbs form and grow around the original, it becomes a large clump of onions by mid-summer. And at the same time more bulbs are forming at the tips of the stems, with bulbs growing out of them, too. They soon become top-heavy and bend to the ground and take root. Did I say they multiply two ways? If conditions are favorable they may even put forth blossoms, then seed, assuring more plants and clumps of onions. Keep them under control or

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FROM the wealth of material available in print on all aspects of gardening and related interests, the following list is offered as a starting point for gift-buying. The readers for whom these books have been selected range from beginners to those with specialized plant interests and include the arm-chair gardener as well as the lover of well-made books. No highly technical books have been listed, though it will be noted that most of the books furnish at least the needed basic technical information.

These books represent, of course, a very small percentage of those available in any one subject and only a few of the subjects of possible interest. They are a sampling, chosen for readability and use and in some cases for beautiful bookmaking. It is hoped that they will suggest other subjects to the shopper.

The list is in two parts: 1) books that are available through bookshops or direct from the publisher; 2) books that are on sale in the Botanic Gardens House. Most of the items in the first list will be on display in the library between now and December 15th. Other books may also be examined there, as well as periodicals for gift subscriptions. For most of the books in both lists prices have been furnished. In the case of the older books these prices were listed as of the date of publica-

tion. They may well be more as of now.

In addition to books for sale in the Botanic Gardens House there are two sets of cards, published by the National Audubon Society, for identifying trees and birds. These are priced at \$2.00 and \$1.50, respectively. Notepaper with a sketch of the Botanic Gardens House is also for sale at \$1.00 for a box of fifteen folders.

And have you thought of giving a membership in the Botanic Gardens? Good shopping!

LIST 1

Hollingsworth, Buckner. Flower chronicles. Rutgers Univ. Press, 1958. \$5.00.

A collection of essays on a variety of individual flowers. Beautifully illustrated with woodcuts from such collections as that at the Pierpont Morgan Library.

Fairbrother, Nan. Men and gardens. Knopf, 1956. \$5.00. Gardens in various periods of history. Illustrated with woodcuts and steel engravings.

Farwell, Edith Foster. My garden gate is on the latch. Published by the author, 1962. Informal essays based on the author's own gardening experience; illustrated with woodcuts and line drawings.

Taloumis, George. Outdoor gardening in pots and boxes. Van Nostrand, \$5.95.

- Teuscher, Henry.* **Window-box gardening; an illustrated guide for the outdoor culture of plants in boxes, tubs, and hanging baskets.** Macmillan, 1956. \$3.95. Written by the curator, Montreal Botanical Garden. Covers principles, adaptations and plants.
- Dulles, Marion.* **Greenhouse gardening around the year.** Macmillan, 1956. \$3.75. Month-by-month activities in the home greenhouse. List of materials and sources.
- Freeman, Margaret B.* **Herbs for the mediaeval household, for cooking, healing and divers uses.** New York Metropolitan Museum of Art, 1948. \$1.50. Beautifully made book.
- Matson, Ruth A.* **Gardening for gourmets.** Doubleday, 1959. \$4.50. Year-round gardening directions for raising vegetables and herbs, with recipes for the use of the product. Has a selected bibliography.
- Clarkson, Rosetta E.* **Herbs, their culture and uses.** Macmillan, 1942. \$2.75. Best basic book on the subject. Has illustrations of individual herbs.
- Rickett, Harold W.* **Botany for gardeners.** Macmillan, 1957. \$4.50.
- Yoshimura, Yuji and G. M. Halford.* **The Japanese art of miniature trees and landscapes, their creation, care and enjoyment.** Charles L. Tuttle Co., 1957. \$7.50.
- Ashberry, Anne.* **Miniature gardens.** Van Nostrand, 1952. \$3.50. Illustrated with photographs and drawings. Lists plants suitable for both indoor and outdoor growing.
- Brilmayer, Bernice.* **All about miniature plants and gardens, indoors and out.** Doubleday, 1963. \$4.95.
- Ginns, R.* **Cacti and other succulents.** Penguin Books, Baltimore, 1964. Paperback, \$2.45. Prepared by a noted British cactus specialist. Good coverage and excellent illustrations. Said to be excellent for amateurs.
- Chidamian, Claude.* **Cacti and other succulents.** American Garden, 1958. \$4.50. Propagation, care and maintenance. Illustrated with drawings.
- Cumming, Roderick and Robert E. Lee.* **Contemporary perennials.** Macmillan, 1960. \$6.95. Selecting, planting and care.
- Rockwell, F. F. and Esther C. Grayson.* **Complete book of roses.** Doubleday, 1958. \$6.75. One of the best all-round books on rose growing.
- Northen, Rebecca T.* **Home orchid growing.** Van Nostrand, 1962. \$10.95.
- American Horticultural Society.* **The peonies.** Published by the Society, 1962. \$5.50. Includes sections on both the herbaceous and the tree varieties.
- Brilmayer, Bernice.* **All about begonias.** Doubleday, 1960. \$4.95.
- Westcott, Cynthia.* **Anyone can grow roses.** Van Nostrand. \$3.75.
- Ballard, Ernesta D.* **The art of training plants.** Harper, 1962. \$4.75. Has a section on bonsai and treats also of small gardens and various forms of shaped plants.
- Favretti, Rudy J.* **Growing for showing.** Doubleday, 1961. \$3.95. Covers techniques for fruits, flowers and vegetables.
- Kranz, Frederick H. and Jacqueline L.* **Gardening indoors under lights.** Viking, 1957. \$4.95.
- McDonald, Elvin.* **The world book of house plants.** World Pub. Co., 1963. \$7.95. Part II is an illustrated encyclopedia of indoor plants. Illustrated with photographs and line drawings.
- Free, Montague.* **All about house plants; their selection, culture and propagation, and how best to use them for decorative effect.** Doubleday, 1953. \$3.50. A standard work, prepared by the former horticulturist at Brooklyn Botanic Garden. Lists plants for various exposures.
- Whitlock, Sarah and Martha Rankin.* **New techniques with dried flowers.** Hearthside Press, Inc., 1962. \$2.50.
- Rodale, J. I.* **How to landscape your**

own home. Rodale Books, Inc., 1963. Good general coverage plus lists of materials for various purposes.

Clements, Julia. A treasury of rose arrangements. Hearthside Press, Inc., 1959. \$3.50. How to arrange roses for home and show. Also rose recipes.

Rickett, H. W. American wildflowers. Odyssey, 1964. \$12.75. Beautifully illustrated with photographs in color which is exceptionally well produced. The author is senior botanist at the New York Botanical Garden.

LIST 2

Craighead, John J. and others. A field guide to Rocky Mountain wildflowers. Houghton, Mifflin, 1963. \$4.95. A companion to Peterson's "Field guide to western birds."

Weber, William A. Handbook of plants of the Colorado front range. \$5.00.

Arp, Louisa Ward. Front Range panorama. \$3.75.

DeBoer, S. R. Around the seasons in Denver parks and gardens. \$2.00.

Carhart, Arthur H. Planning for America's wildlands. \$2.50.

Roberts, Harold and Rhoda. Colorado wild flowers. \$1.25.

Willard, Bettie E. and Chester O. Harris. Alpine wildflowers of Rocky Mountain National Park. \$.75.

Roberts and Nelson. Mountain wild flowers of Colorado. \$1.25.

Harrington, H. D. and L. W. Durrell. How to identify plants. \$1.45.

Pesman, M. Walter. Meet the natives. \$3.00.

Pesman, M. Walter. Meet Flora Mexicana. \$4.00.

Kelly, George W. How to have good gardens in the sunshine state. \$3.00.

Harlow, William M. Fruit key and twig key. \$1.25.

Nelson, Ruth Ashton. Plants of the Rocky Mountain National Park. \$1.10.

Northen, Henry T. and Rebecca T. The secret of the green thumb. \$5.00.



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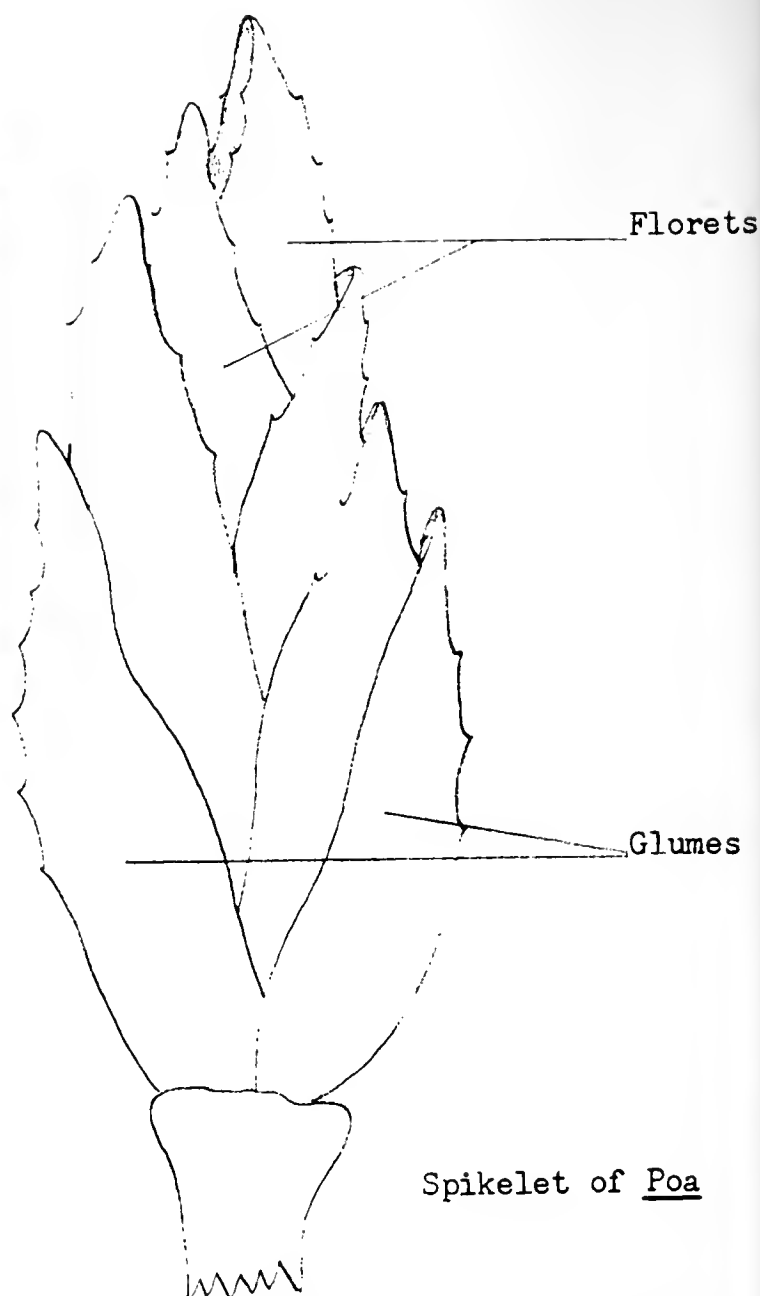
Poa, the bluegrass genus, a member of the grass family (Gramineae), consists of more than 100 species which occur in most of the temperate and cold regions of the world. The bluegrasses received their generic name from the Greek *poa*, meaning grass or fodder.

Poa pratensis, Kentucky bluegrass, is grown as a lawn grass in most of the northern parts of the United States. It is also used as a forage or pasture grass in humid areas where the soil contains a high lime content. Without a doubt, there is no lawn grass better suited to the Denver area than Kentucky bluegrass and its varieties.

Kentucky bluegrass is so familiar to Americans that many believe that it is native to the United States. On the contrary, Kentucky bluegrass, regardless of what is implied by its common name, is native to Europe and later, became naturalized over most of the cool, moist parts of North America.

The specific name of Kentucky bluegrass, *pratensis*, means of meadows and was derived from the Latin *pratium*.

A common lawn weed in our area is the annual bluegrass, *Poa annua*, which grows lush and green in the spring but dies in the early summer, leaving ugly brown spots in the lawn. These brown spots, left by the dead



Spikelet of *Poa*

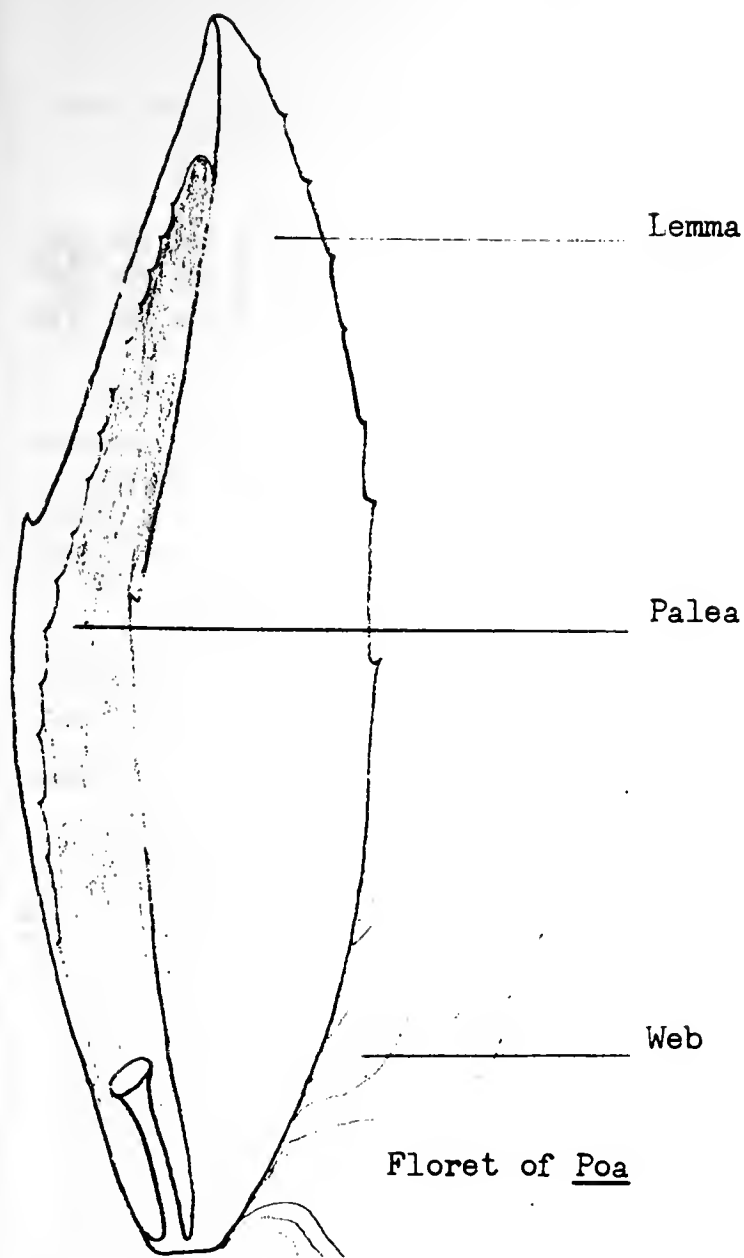
annual bluegrass, are often misinterpreted as being the results of the activity of a disease organism. Much time and effort is spent in treating such areas with expensive fungicides in an attempt to control a disease organism that is not really present.

The annual bluegrass' specific name was derived from the Latin *annuus* (yearly) and alludes to its annual habit of growth. (The term annual, when applied to plants, indicates a plant

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which lives but one year, during which time it completes vegetative growth, flower production and finally the production of seed.)

Poa compressa or Canada bluegrass, is also a native of Europe which has become naturalized over much of the United States and Canada. The spe-



cific name, *compressa*, was derived from the Latin *compressus* (to compress) and refers to the strongly flattened condition of the culm or jointed stem of the grass.

The bulbous bluegrass, *Poa bulbosa*, is another native of Europe which has been introduced into the United States. The specific name, *bulbosa*, refers to the bulbous condition of the bases of the culm. Bulbous bluegrass, which is common in the northwestern United

States, is cultivated as a forage plant and is propagated by the bulblets.

Poa alpina, alpine bluegrass, is one of the 30 or more species of bluegrasses found in Colorado. It receives its specific name, *alpina*, from the fact that it is found growing mostly at high altitudes or in the Arctic regions of the Northern Hemisphere. In Colorado, it occurs mostly at altitudes above 10,000 feet.

Many famous botanists have had bluegrasses named in their honor. Among them are the following: Wil-

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liam Conklin Cusick (1842-1922) (*Poa cusickii*). Explored the Wallowa Mountains and in eastern Oregon; August Fendler (1813-1883) (*P. fendleriana*). Explored New Mexico, Venezuela, Panama and other portions of South America; Albert Kellogg (1813-1887) (*P. kelloggii*). One of the founders of the California Academy of Sciences; Harry Norton Patterson (1853-1919) (*P. pattersoni*). One of the early botanical collectors in Colorado; John Wolf (1820-1897) (*P. wolffi*). Another early collector of plants in Colorado.

States and other geographical divisions are also represented in the terminology of the bluegrasses; *Poa arctica*, *P. nevadensis*, *P. occidentalis*.



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Up to this time the Denver Botanic Gardens has operated with only a limited number of volunteers to assist the four staff members and three maintenance men. With the opening of the conservatory and operating greenhouses scheduled for next year, it has become obvious that a large organization is needed to cope with the increasing activities.

Therefore, a **new volunteer organization — Associates of Denver Botanic Gardens — is being formed.** Membership will be open to any man or woman who is interested in the Gardens and wishes to help. Dependable workers are needed for the following activities: 1) to groom the plantings in the Gardens, 2) to guide tours through the various units of the Gardens, 3) to act as hostesses in the House, 4) to assist in the Library, Herbarium, and proposed gift shop, 5) to help with educational programs, 6) to help with stenographic and clerical work, labeling, mapping, and flower arrangements. More information can be obtained at Botanic Gardens House — or you can phone for registration or fill out the membership blank on the following page. Manager of the Associates is Mrs. Chard Smith, Jr. (756-1327); Assistant Manager is Mrs. Graham Morrison (424-0706).

ASSOCIATES OF DENVER BOTANIC GARDENS
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hostess	_____Promotion
sewing	_____Editorial Work
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flower arrangements	_____
_____Garden Maintenance	_____
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SKILLS

Please tell us a bit of your background; any degrees, special skills, ordinary skills, or whatever brings you to Associates.

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Denver Botanic Gardens

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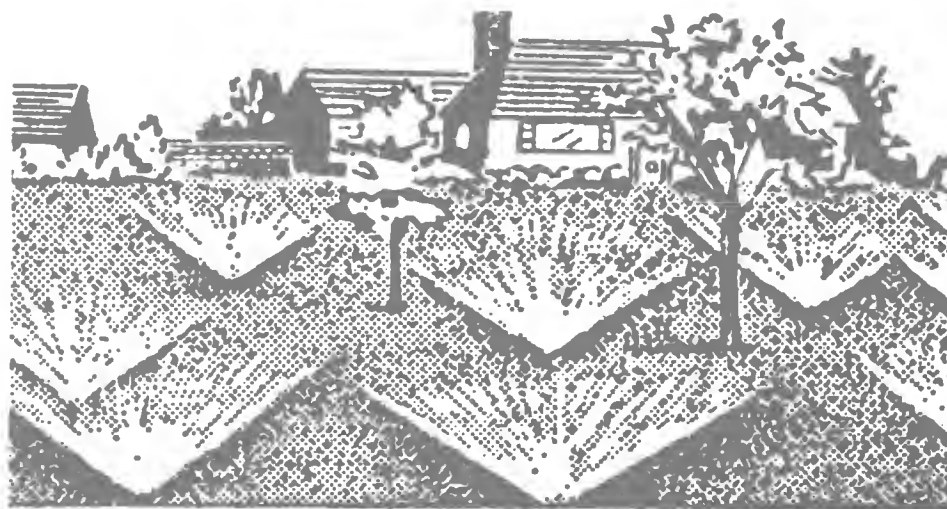
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A Publication of Denver Botanic Gardens

NOVEMBER - DECEMBER

1964





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THE COVER

THE CHRISTMAS ROSE

Original drawing by Polly Steele
(See Page 279 for Cover Story.)

THE NATIONAL COUNCIL of Garden Clubs is a federation of garden clubs from 47 states and the District of Columbia. For the past 32 years the National Council has had a bird program and now all the affiliates have a Bird Chairman supporting that program.

The National Slogan is "Every Garden a Bird Sanctuary" and Colorado, being a member of this federation, with 119 clubs, has adopted this slogan as one of its objectives. Of the Colorado clubs, 65 have bird programs which include the following suggestions: every club member should learn five characteristics of the Colorado State Bird, the Lark Bunting; each member should learn to identify five new birds each year; each member should be alert to the dangers of the misuse of insecticides and work for pesticide legislation; each member should support all legislation that will aid in increasing bird-life and conserving habitats; and each member should try to make every garden a bird sanctuary.

PLANTING THE BIRD SANCTUARY

Some thick shrubs, a tall tree and an evergreen, either a pine, spruce or juniper, are an excellent start for a bird sanctuary. Other shrubs and trees attractive to birds may be planted later, space permitting.

SHRUBS

In selecting shrubs, the viburnums should be considered as they are easily grown and produce fruits liked by birds. Especially desirable is the American cranberry bush viburnum, *Viburnum trilobum*, which grows from 8 to 10 feet high and produces bright red fruits (*drupes). Another is the

*Editor's Note: The names in parentheses represent the correct botanical nomenclature for the fruits under discussion.

Every Garden A Bird Sanctuary

MERLE C. BARBOUR

nannyberry viburnum, *V. lentago*, which is a tall shrub with very beautiful autumn foliage and blue-black fruits (drupes). The American elder, *Sambucus canadensis*, has purple fruits (drupes) which are good for pie or jelly if the birds do not get them first. The golden currant, *Ribes aureum*, has fragrant yellow flowers, black to purplish fruits (berries) and colorful fall foliage. A good background shrub is the rosy Tatarian honeysuckle, *Lonicera tatarica rosea*, which grows to a height of 10 feet and has deep pink flowers and attractive red fruits (berries) which make good bird food. *Lonicera morrowii*, Morrow honeysuckle, grows 8 feet tall and has creamy white flowers in May and yellow or red fruits (berries) from August to late fall. The pin or bird cherry, *Prunus pensylvanica*, is a neat and attractive native shrub which has fragrant white blossoms and tiny bright red cherries in the summer. The handsome firethorn, *Pyracantha coccinea lalandii*, is worth trying. It produces orange-red fruits (pomes) that are enjoyed by the waxwings. The Peking cotoneaster,



Cotoneaster acutifolia, grows about 6 feet tall, has small glossy leaves and attractive black fruits (pomes) that hang on all winter. Another cotoneaster, *C. horizontalis*, is a low-growing evergreen shrub covered with scarlet fruits (pomes). The European privet, *Ligustrum vulgare*, if not clipped, produces black fruits (berries) that the waxwings and other birds like.

The Japanese or multiflora rose, *Rosa multiflora*, is usually covered with small, red, oval fruits (hips) that birds enjoy. If there is room for a wild tangle, let some blackberries and raspberries, *Rubus* spp., grow wild and undisturbed. All birds love a thicket.

VINES

Some vines provide bird food but should not be planted near bedroom windows, unless one is an early riser. The Virginia creeper, *Parthenocissus*

quinquefolia, has blue fruits (berries) which are eaten by many birds. Birds are also attracted by wild grapes, *Vitis* spp. The trumpet vine, *Campsis radicans*, is attractive to the hummingbirds and they also like the everblooming honeysuckle, *Lonicera heckrotti*. The American bittersweet, *Celastrus scandens*, has orange colored seeds that are eaten by winter birds. It is hard to get established but once under way it does well. Be sure to plant three to insure pollination.

SMALL TREES

Hawthorns, *Crataegus* spp., are beautiful small trees. They have lovely blossoms, brilliant red fruits (pomes) and thick, thorny branches that offer ideal locations for nest building and which afford protection from cats. The fruit (drupe) of the chokecherry, *Prunus virginiana demissa*, is eaten by several species of birds. The fruits



(Photo courtesy of Denver Museum of Natural History)

BOHEMIAN WAXWING

(pomes) of the mountain ash, *Sorbus* spp., are a favorite food of Robins and Bohemian Waxwings. The Russian olive, *Elaeagnus angustifolia*, has silver-gray leaves and fruits (drupes) and is most attractive to birds. The flowering crab apples, *Malus* spp., are high on the list of small trees which provide food and shelter for birds. They provide good fall and winter food and also early nesting foods.

LARGE TREES

Should the area to be planted require larger trees, any of the following could be the answer; Colorado or blue spruce (*Picea pungens*), Engelmann spruce (*P. engelmanni*), Scotch pine (*Pinus*

sylvestris), ponderosa pine (*P. ponderosa*) and Douglas fir (*Pseudotsuga taxifolia*). All of these large evergreen trees are good for shelter and the Evening Grosbeaks eat their seeds. The common hackberry, *Celtis occidentalis*, is a good tree for Colorado. It is a slow grower, comparatively disease resistant and has dark purple, sweet tasting fruits (drupes) which are a favorite bird food. The Siberian elm, *Ulmus pumila*, is a fast growing tree but is subject to wind and snow damage unless properly trimmed. This spring its heavy crop of fruits (samaras) was enjoyed by a large flock of Evening Grosbeaks. The green ash, *Fraxinus pennsylvanica lanceolata*, is a tree of good shape, disease free and has beautiful autumn foliage. This fall it was heavily laden with fruits (samaras) which were eaten by the House Finches.

HERBACEOUS PLANTS

No garden would be complete without herbaceous flowering plants to add fragrance and a touch of color. In addition to these benefits, many varieties are also a source of bird food. The hummingbirds are attracted by the flowers of the honeysuckle and trumpet vines, by petunia, phlox, gladiolus, red gilia (which is a biennial and must be allowed to reseed in order to insure

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continuous blooming plants) and the bee balm, *Monarda* spp., which has been called their "ice cream".

To attract other birds, select a special spot that need not be trimmed or cleaned away for the winter and sow cosmos, sunflowers, fall asters (Michaelmas daisies), hollyhocks and brown-eyed Susans (*Rudbeckia triloba*). It is sheer joy to watch yellow and



(Photo courtesy of Denver Museum of Natural History)

LESSER GOLDFINCH

black goldfinches perched atop a fall aster, busily eating the seeds. Two species of the goldfinches, the American and Lesser, are fall visitors. The chickadees and House Finches will find the sunflower seeds.

FEEDING AND WATERING

In order to attract migrant and winter birds to the sanctuary, give them food and water. If feeding birds for the first time, start with an open tray — shallow, rectangular and about 18 by 14 inches and about 2 inches deep. Bore small holes in the bottom to allow the drainage of rain or snow. The birds will find the seeds that fall through the holes. Place the tray about 4½ feet from the ground in an open space but near shrubbery, especially evergreens that will serve as a windbreak and afford shelter and protection from a hawk or cat. Place coarse bread crumbs on the tray, making sure they are large

enough to be seen from a distance and the birds will start coming to the tray. Many but not all birds, will eat bread and although it is not a high nutritional food for them, it does attract them and is a supplement to any grain mixture. Once they have formed the habit of coming to the open feeder, change to a covered one which protects the seed from bad weather. Many types of feeders are available, even window box feeders “for small birds only” and those with levers that bar starlings and larger birds. Starlings now are believed to eat Japanese beetle grubs so are looked upon more favorably.

In order to discourage starlings as well as jays, grackles and pigeons, restrict the feeding to suet sticks or candles and provide feeders with small openings. Do not use open trays or place food on the ground.

It has been found that sunflower and millet seeds are the choice of the seed-



(Photo courtesy of Denver Museum of Natural History)

HOUSE FINCH

eaters. Grit or coarse sand may be hard for birds to find when the ground is snow-covered and since they help to digest the seeds after they reach the gizzard or stomach, a supply of it should be near the feeder and available at all times.

Hard white beef suet is a good supplement to the diet of birds which eat insects. It may be hung in wire baskets or a suet feeder and will entice the Downy and Hairy Woodpeckers, chickadees, finches and nuthatches. Stale doughnuts hung from a branch or clothes line will be a treat to many birds. Peanut butter or a peanut mixture was once a food for chickadees and others but it is now considered injurious to a bird's kidneys and is not to be used. There is a mixture called

"Chickadee Pudding" that many birds enjoy. It is prepared as follows: $1\frac{1}{2}$ cups of melted beef suet, $\frac{1}{2}$ cup cornmeal, 1 cup uncooked oatmeal, $1\frac{1}{2}$ cups of bread crumbs, $\frac{1}{2}$ cup white flour and $\frac{1}{4}$ cup of sugar, add bird seed as desired. Mix thoroughly in a shallow pan. Allow this mixture to harden and then cut into handy sized pieces. This mixture may be made in cottage cheese cartons and hung from tree branches. Suet candles are easily prepared. Double a 2-foot length of stout cord and place the folded end in the bottom of a pan and let the loose

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ends hang free; pour in some melted suet to which chopped peanuts and millet have been added; allow this mixture to harden. After hardening, it can be removed from the pan with hot water and hung in a tree, using the loose ends of the cord. It should be hung close to a branch so that it will not sway in the wind.

Once bird feeding has started, it should be a consistent practice. It is better not to start at all than to feed them intermittently. A bird's temperature is about 110-112 degrees Fahrenheit and it must consume a lot of food to keep its body heat at the proper level. Deprived of its accustomed source of food a bird is helpless to withstand severe cold weather. A constant supply of feeds and suet at a feeding station will save many resident winter birds and perhaps a transient. It is important to have several feeders. Birds do not like to be crowded when eating.

Many people forget that birds need water in the winter just as in the summer. A birdbath is essential to any bird attracting program and in summer



(Photo courtesy of Denver Museum of Natural History)

ROBIN

it may attract more birds than the feeders. The birdbath should be shallow; not more than 2 inches deep at the edge, sloping gradually to not more than 4 inches deep at the center. A rough concrete surface helps to keep birds from slipping, as do rocks placed on a smooth surface. Birds bathe and drink in the same water so that the birdbath should be cleaned and fresh water supplied, at least every other day. Small birds such as finches, Song Sparrows, warblers and others will bathe only in shallow water; the larger Robins, jays and grackles will use the deepest part.

Birds enjoy warm water in winter and there are electric water warmers available in poultry supply stores. If one is not fortunate enough to have a warmer, very hot water may be added to the cold water in the bath several times during an extremely cold day.

The birdbath should not be placed too near shrubbery if there is danger from cats.

Feeders for hummingbirds should be placed early for spring migrants so as to be ready when they arrive. They can be placed almost anywhere and need not be confined to the garden area. They can be attached to large trees at a height of about 5 feet. Often they are hung from porches or near windows. There are many feeders on the market but a small bottle painted with red nail polish will suffice. Many who have been feeding hummingbirds with sugar and water must now change. Studies have shown that a continuous oversupply of carbohydrates causes a liver ailment in the little birds, which may prove fatal. A new and better method is to fill the feeder with one part of honey and three parts of boiled water (the hot water prevents fermen-



(Photo courtesy of Denver Museum of Natural History)

YELLOW WARBLER

tation) and the hummingbirds will thrive.

To encourage nesting birds to build a nest and raise a family, place short pieces of string of varying lengths and hair combs in a convenient place, allowing a few strings to dangle. Some birds, the Robins for one, use mud to plaster their nests, so a small muddy spot in the garden should be available.

Many people have asked should they feed birds the year round. Roger Tory Peterson says: "Is not our pleasure reason enough? Where as the same birds might survive well enough in some thicket in the neighborhood, is it not better to see them every day? Don't believe for a moment that we pauperize birds by doling out the feed. The chickadee that helps itself to the suet will also investigate every insect-infested

twig or cranny in the neighborhood."

"There is no question that putting out bird boxes, food plants, protective cover and water has conservation significance, for it increases the carrying capacity of the land. An acre that harbors two breeding pairs of birds can be made to support five — an increase of 150 per cent. A hundred acres as intensely managed could mean an increase of 600 individuals. Build-ups even greater than this are possible."

Records, kept for the past three years, of birds visiting two average sized garden sanctuaries, show that many of the same species appeared in both gardens. A few of the visitors were listed in one but not the other garden so that each listed a bird or two not shared by the other.

These gardens, about 1½ miles apart, are situated in a thickly populated residential section of a suburb adjoining Denver.

The following birds were listed:

- Blackbird, Brewer's
- Bluebird, Mountain
- Bunting, Lazuli
- Catbird
- Chickadee, Black-capped
- Chickadee, Mountain
- Cowbird, Common
- Creeper
- Cuckoo, Yellow-billed
- Dove, Mourning
- Finch, Cassin's Purple
- Finch, House
- Flicker, Red-shafted
- Goldfinch, Arkansas (Lesser)
- Goldfinch, Common (American)
- Grackle, Bronzed (Common)
- Grosbeak, Black-headed
- Grosbeak, Evening
- Grosbeak, Pine (Rose-breasted)
- Hawk, Sharp-shinned
- Hawk, Sparrow
- Hummingbird, Broad-tailed
- Hummingbird, Rufous
- Jay, Blue
- Junco, Gray-headed
- Junco, Oregon
- Junco, Slate-colored
- Junco, White-winged

Kinglet, Ruby-crowned
 Magpie, American (Black-billed)
 Mockingbird, Western
 Nighthawk
 Nuthatch, Red-breasted
 Nuthatch, White-breasted
 Oriole, Bullock's
 Pewee, Western Wood
 Red-wing, Common (Red-Wing Blackbird)
 Robin
 Siskin, Pine
 Solitaire, Townsend's
 Sparrow, Chipping
 Sparrow, House
 Sparrow, Song
 Sparrow, Tree
 Sparrow, Vesper
 Sparrow, White-crowned
 Sparrow, White-throated

Tanager, Western
 Thrasher, Brown
 Towhee, Green-tailed
 Towhee, Rufous-sided
 Warbler, Macgillivray's
 Warbler, Pileolated (Wilson's)
 Warbler, Yellow
 Warbler, Yellow-throat
 Waxwing, Bohemian
 Waxwing, Cedar
 Woodpecker, Downy
 Woodpecker, Hairy
 Wren, House
 Wren, Rock

Several of the aforementioned birds made repeated visits; many were winter guests; others spent the summer; and a few were spring or fall transients.

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CHRISTMAS PLANTS

HELEN MARSH ZEINER

PLANTS ARE popular gifts at Christmas time. If you receive a lovely plant, you are of course anxious to keep it in good condition as long as possible. This can be done by giving the plant proper care.

Keep in mind that these gift plants have been grown in a greenhouse under carefully controlled conditions which were ideal for that particular plant. We can hardly expect to duplicate these conditions in the home but we can provide the best care possible under home conditions and keep our gift plants attractive for a maximum period of time.

Probably the most popular of all Christmas plants is the poinsettia. New varieties have been developed so that the plant you receive may have "blooms" in some shade of pink or rose or even white rather than the traditional red. The so-called flowers are actually bracts or modified leaves. What appears to be centers of these "flowers" are the actual flowers. Many of the new poinsettias are compact in growth and are generally better plants than we used to have.

When a poinsettia arrives at your home, try to find a location where it will be out of drafts and where it will

receive some sun. If this location does not display the plant to its best advantage, move it for a few hours to darker parts of the room where it can serve its decorative purpose but then return it to its sunny location.

Keep the soil moist — if the poinsettia is permitted to dry to the point of wilting, the period of attractiveness will be shortened. The plant must not be kept soggy — merely moist.

Poinsettias do not like great fluctuations in temperature. They would do well with a temperature of 70° Fahrenheit days and 65° Fahrenheit nights. In most homes day temperatures are higher than this. The poinsettia will tolerate these higher temperatures if the night temperatures do not drop too abruptly and too greatly.

Sooner or later the leaves will drop. Then you can discard the plant or if you have the facilities and the patience to care for the plant, you can hold it over for another year. Rest it until spring by storing it in a cool, dark basement where it should be kept dry. After danger of frost is past, cut the plant back severely, repot and sink the pot in a sunny part of the garden. Keep moist. In August, prune again to shape

the plant and reduce its size if necessary. Bring indoors before there is any danger of frost and keep it in a sunny location out of drafts. Keep moist but not wet. Feed about once a month with the plant food of your choice.

Since the poinsettia is a short-day plant ("Short-day" plants flower only if provided with less than a certain length of light. If short-day plants receive more light than this maximum, they remain vegetative.), you will need to cover it with a dark cloth or other opaque cover to shut out the light so that it receives no more than 12 hours of light, artificial or daylight. Do this from the middle of September until buds appear. If you do not want to go to this trouble, accept the poinsettia as an attractive foliage plant and do not be disappointed if it does not bloom a second year.

The azalea is another very popular gift plant and one that most people can maintain for several years. It should be kept in as cool a location as possible but it must receive good light. It may be displayed in other parts of the room so long as it spends most of its time in the cooler, light location. The azalea should be kept moist but never water-logged. Spray the leaves with water frequently. This compensates for lack of humidity and also dis-

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courages red spiders, the one insect pest which may cause you trouble. If you find red spiders, wash the leaves well with naphtha soap and rinse thoroughly. If this does not prove effective, spray the azalea with nicotine sulphate or malathion.

Spraying the plant with water is particularly important while it is in bud.



(Photo courtesy of
Florists' Telegraph Delivery Association)

POINSETTIA

Buds may blast if the air is too hot or dry. If the soil is permitted to become too dry, blasting of buds may also result. The azalea may benefit from being placed on a gravel-filled pan in which water is kept. The water should be below the base of the pot, so that the plant never stands in water. Evaporating water from the pan helps to increase humidity around the plant.

During the summer, the pot should be sunk outdoors in a shady location. Be sure that it is kept well-watered. Before there is any danger of frost, prune the azalea to shape, check carefully for the presence of pests and bring into the house to a cool well-lighted spot. A well-lighted basement window is frequently good.

Feed the azalea about once a month. About once a month or every six



(Photo courtesy of Jackson & Perkins Company)
SOUTH AFRICAN AMARYLLIS

weeks, you may add $\frac{1}{4}$ teaspoon iron sulphate to the pot. Lacking this, you can use 1 teaspoon of household vinegar to a quart of water. Use this solution only when the soil is moist. Both of these treatments acidify the soil.

You will find that some shoots will grow more rapidly than others, so keep these pruned to maintain a well-shaped plant. Remove blossoms as they fade.

The azalea, if kept over several years, will need repotting about the second year. Use plenty of peat in the soil and be sure that you provide good drainage in the pot.

The Christmas begonias, usually 'Lady Mac' or a strain of 'Lady Mac', are very popular at the present time. To maintain a long blooming period, give the Christmas begonia some sun but avoid full exposure to the sun because this creates an environment

which is too hot and too dry and can cause leaf fall and drying-up of buds. Spray the plant with water frequently and if possible keep it on a gravel-filled pan where evaporating water will create a moist atmosphere. Water the plant moderately — let it dry out (but not to the point of wilting) between watering periods. Good drainage is essential.

After blooming, most people will find it best to discard the Christmas begonia. However, if you wish to keep it, cut the plant back severely. Keep it moist and light and as soon as danger of frost is past, sink the pot outdoors in a partially shaded location. Bring in early in the fall and repeat the care you gave it while it was in bloom. The parts which you cut off can be made into cuttings and rooted in moist soil or vermiculite to provide young plants for the following season.

You may receive a beautiful hybrid South African amaryllis. To keep the blossoms as long as possible, locate the amaryllis in a cool light part of the room but do not put it in direct sunlight. Keep it moist.

After blooming, continue to water the plant and feed it about once a month. Good care now is important, for you are building up the bulb so that it will produce blooms the next year. The plant should produce several large, healthy leaves to strengthen the

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bulb. In the spring, sink the pot in the garden in a semi-shaded spot. Keep moist.

Before danger of frost, return the amaryllis to the house. Store it perfectly dry in a cool part of the basement. Cut off the foliage as it yellows. Let the bulb rest for three months. Then bring it back to the light, water

it well and keep it moist, fertilize about once a month and watch for blooms to appear. Sometimes a forced bulb will not bloom the first year after forcing. If this happens, don't give up — continue to build up the bulb and it will probably reward you the following year.

Christmas peppers with their cheery red fruits are often on the list of gift plants. The Christmas pepper should be kept cool, out of drafts and should receive lots of light. If the room is too hot and dry, the leaves and fruit may drop. The soil must not dry out. After the peppers fall, either discard the plant or cut it back and rest it until late May when it may be set into the garden for

the summer. It may bloom and produce peppers to make a bright spot in the garden. You can save seeds from fully ripe peppers and plant them in May or June to provide young plants for winter use. The old-fashioned Jerusalem cherry is being used again as a Christmas plant. It requires about the same care as the Christmas pepper.

Because we cannot always give gift plants ideal growing conditions, many of us will find it better to enjoy them while their beauty lasts and then discard them as we would cut-flowers. Unless you can provide them with suitable growing conditions, there is not much point in trying to hold these plants over for another year.

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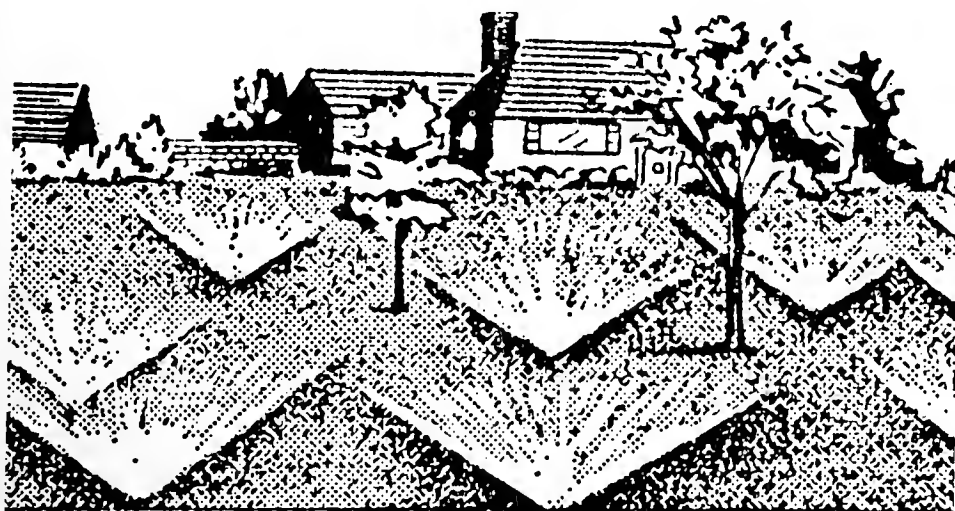
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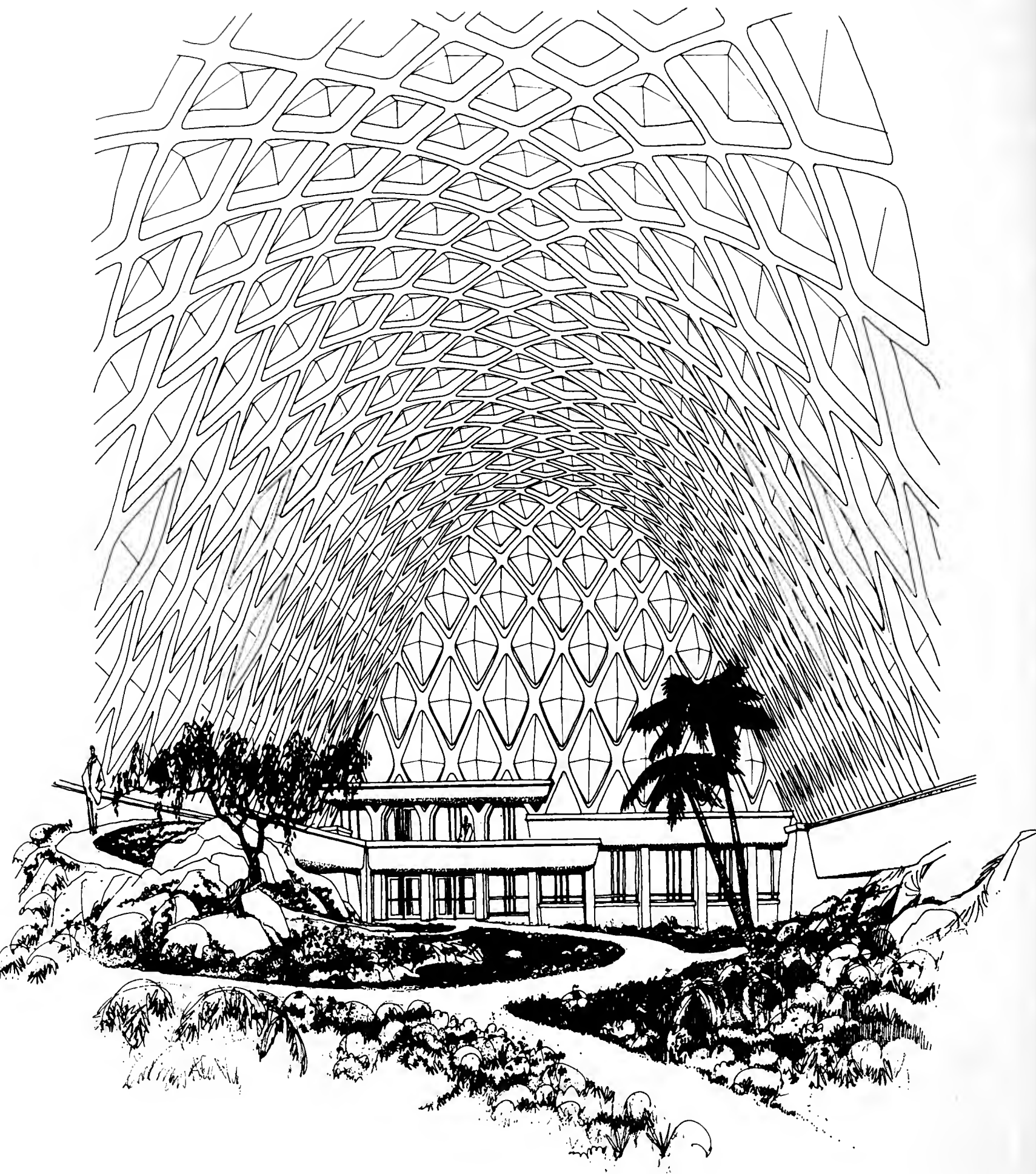
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C O N S E R V A T O R Y
I N T E R I O R

THE BOETTCHER CONSERVATORY

A Report from the Architects

VICTOR HORNBEIN

and

EDWARD D. WHITE, JR.

THE CONSERVATORY construction is well under way and it must now be apparent to even the most inexperienced of sidewalk superintendents that the building is constructed of concrete — not of wood, as was the mistaken conclusion of some we know who confused the temporary scaffolding and framework with the final structure.

The structure now taking shape is the result of more than three years of study and design, starting as a simple greenhouse and growing in scope and structural complexity until its present size, shape and construction were determined. Imposing as the Conservatory appears, however, it is only a part — although the dominant part — of a complex of buildings planned for the Denver Botanic Gardens.

The fundamental requirements of a botanic garden — a garden, a conservatory, a library, an herbarium, a research program and an educational program — served as the basic design program for the buildings. Essentially, a botanic garden is an educational and research institution, with the pleasure deriving from study or even casual acquaintance with plant material as an important secondary benefit.

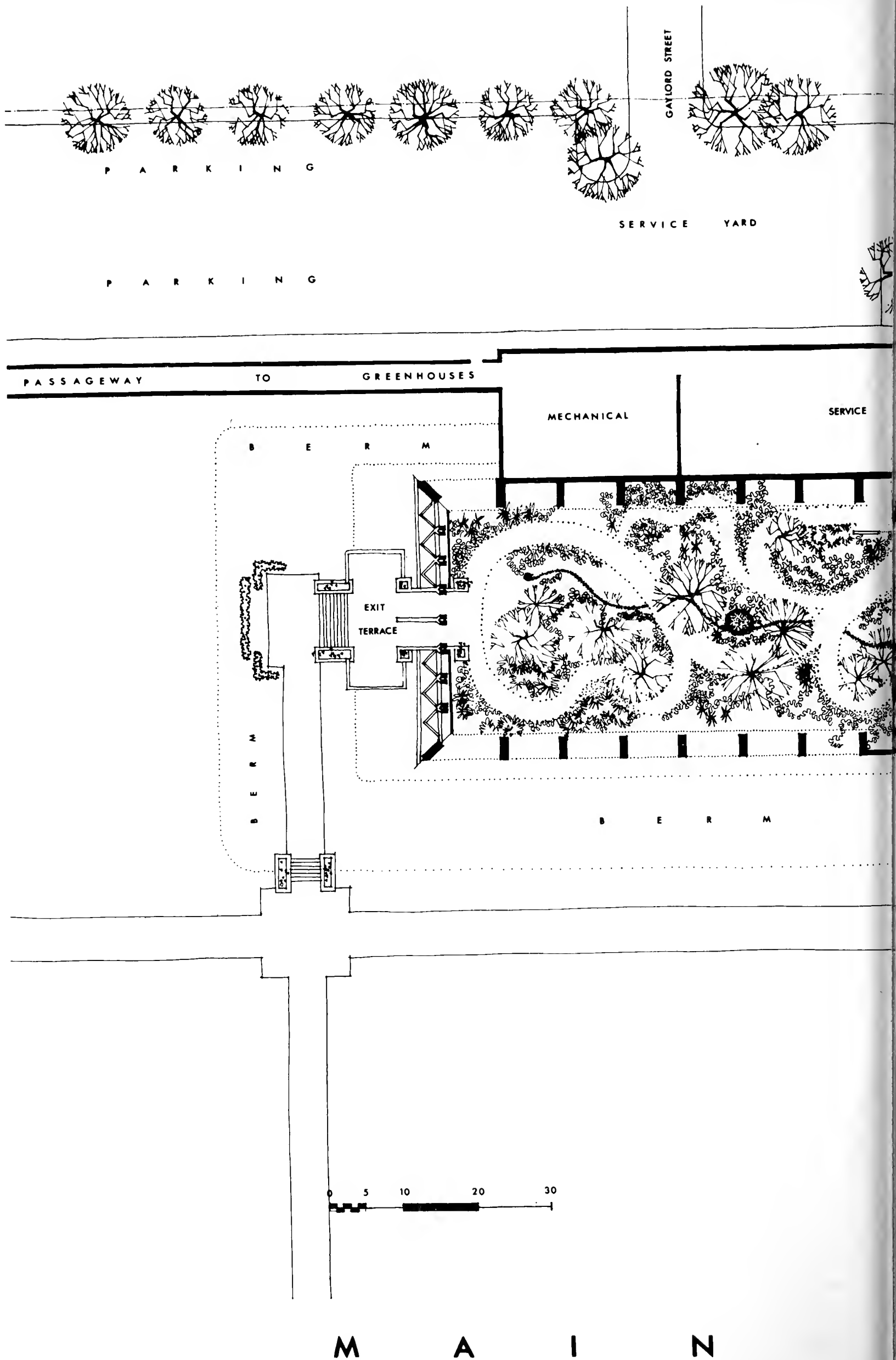
Such an institution has several functions, including plant research; the

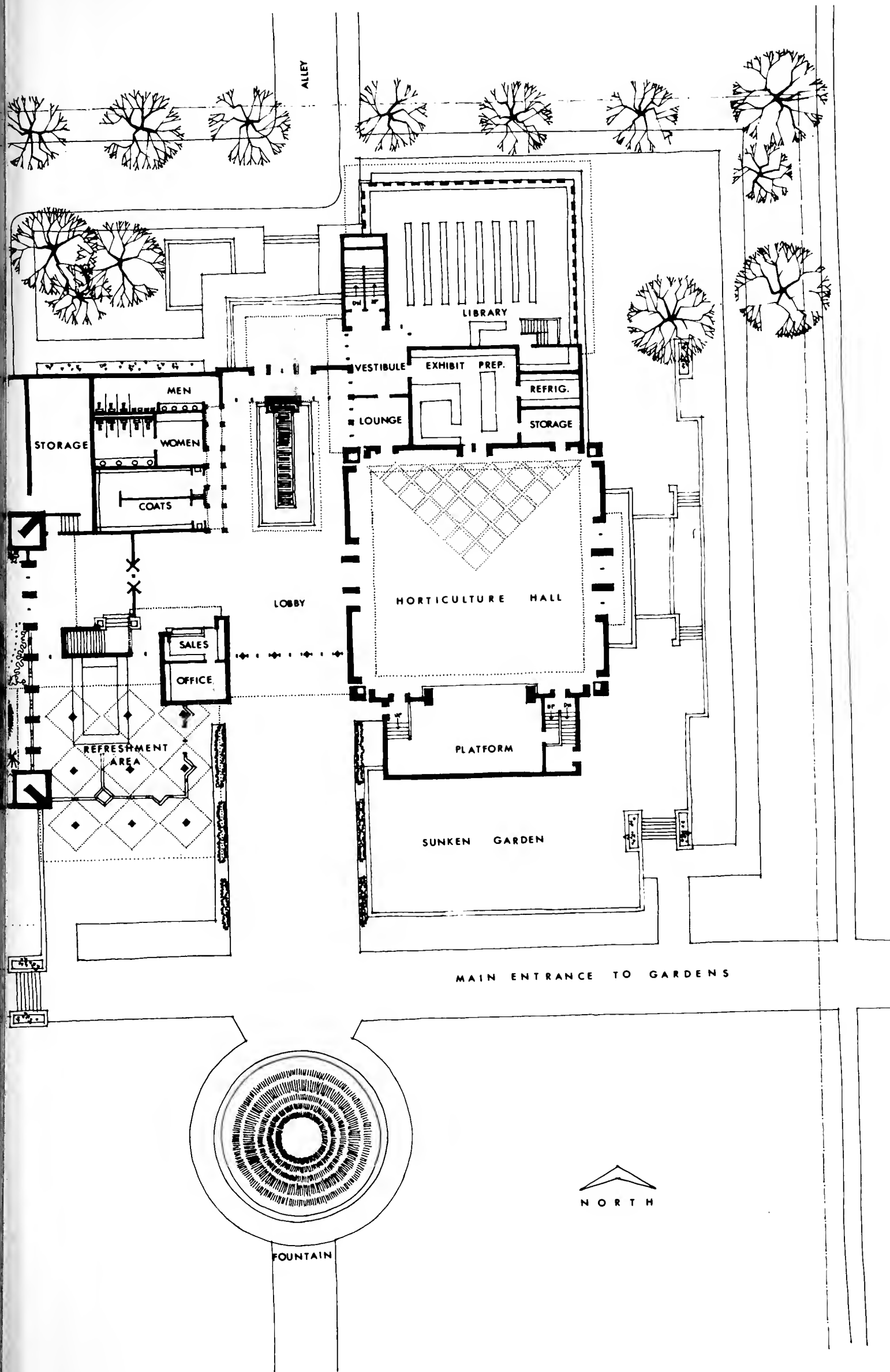
exhibition of living plants, among them plants not native to the immediate region; maintenance of a library and an herbarium; and organization of lecture and laboratory classes in the science of botany and the art of horticulture.

All these functions and more will be provided for in the new buildings.

The building complex was located between the north property line and the main axis of the garden, so that from the lookout east of York Street, the vista over Cheesman Park and on to the mountains would remain uninterrupted and the integrity of the garden property to the south and west of the Conservatory would be preserved. The relations and proportion between outdoor gardens and structures were important considerations in the site plan as was the convenience of access, both public and service.

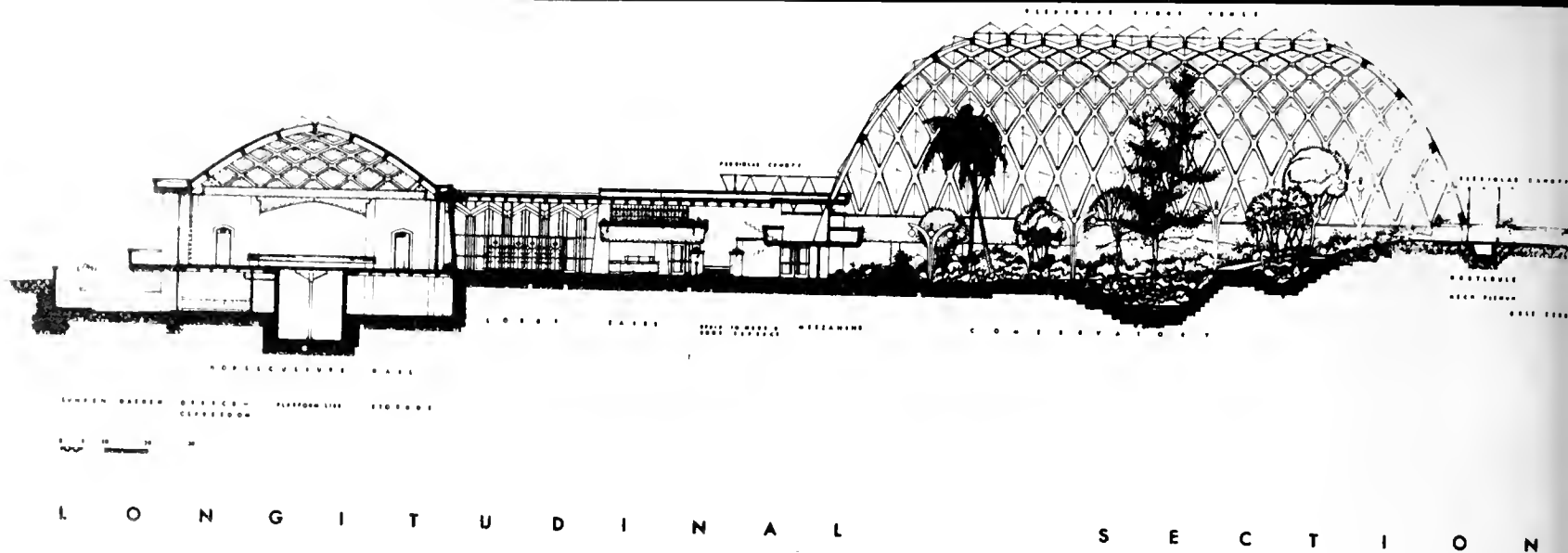
The Conservatory was placed on the high point of the immediate area to give it dominance. Horticulture Hall was located adjacent in such a way as to make use of the common lobby and public facilities and as a secondary element, aesthetically, to the Conservatory. The slope of the ground permitted making the north part of Horticulture Hall three stories high but nevertheless subordinant to the two





YORK STREET

F L O O R



major elements, the Conservatory and the two-story south part of Horticulture Hall.

The disposition of the major building elements in relation to each other was decided, in addition to the major design considerations of function, circulation and massing, by the desire of the donors of the Conservatory to have that element serve as a memorial and consequently to be somewhat apart from the remainder of the structure.

Horticulture Hall was planned to permit a separation of its several elements, with conference rooms, laboratories, library and herbarium as one group of related functions; the exhibition hall and flower preparation room as a second; and the lecture and classrooms as a third.

Each of these functions can be made accessible to the general public without interfering with activities in any of the other areas. Consequently, as required, certain areas can be closed off, allowing use of the remaining areas.

The exhibition hall, which will eventually share with and be separated from the Conservatory by the main lobby, will also serve as a meeting and lecture room, as well as (to satisfy another community need) a place where chamber music concerts might be held.

Requirements for access were public entrances from the main garden entrance and from the future parking lot to the north; a service entrance for the exhibit preparation area; separate ex-

terior entrances for classrooms; a service entrance for the Conservatory large enough to accommodate trucks up to two or three-ton capacity; and enclosed circulation between the growing houses, the conservatory and the exhibit hall.

A refreshment area was required to be accessible to visitors to the garden whether they had paid admission to the Conservatory or not, although the roof terrace which overlooks the garden and where food service can be made available, was to be reserved for those who had.

The roof terrace and the west exit of the Conservatory command views to the west and south of the gardens and of the Rocky Mountains and both of these lookout points are included in the present construction work.

Only the Conservatory portion of the building complex is now under construction. Plans for the other elements have been completed and two greenhouses are soon to be added to the west of the Conservatory.

Horticulture Hall, however, with the main lobby, library, herbarium and laboratory and classroom facilities, cannot be built until the necessary construction money has been raised, hopefully early in 1965. The requirements and design of this building will be an appropriate subject for a future article.

The requirements for the Conservatory, however, have presented the greatest number of problems for solution, problems of function and con-

struction as well as aesthetics. It must be as free of maintenance as possible. It must be as free as possible of condensation drip, a failing of many existing conservatories. Final decision on details involving condensation gutters were made after testing and experimentation on a full size model of a critical portion of the vault, which has been on display at the building site since the ground-breaking ceremony. It must have a two-level entrance and high observation points because gardens take on added dimensions of beauty when viewed from above. It must avoid raised portions of the roof to accommodate high trees because of weather-proofing problems, as experienced in many of the older houses, as at Kew Gardens and the New York Botanical Garden.

The solutions to these problems are now a part of the working drawings and will soon be solutions in fact as well as theory but it might be appropriate to call attention to the varying levels in the topography within the Conservatory, which were designed to provide the elevated overlooks, height for larger trees and, generally, a more interesting indoor garden. The traditional approach has been to maintain level ground and to vary the height of the structure.

Concrete was selected as the primary construction material because, in addition to its maintenance-free characteristics, its aesthetic potential and a variety of other merits, the donor Foundation believed that, because the Conservatory will be a memorial to the late Claude Boettcher, founder of The Ideal Cement Company, a fitting memorial might well be constructed of reinforced concrete. The structure has, accordingly, been studied to express some of the remarkable possibilities of this plastic material.

The heating, cooling and ventilating systems create the climate in the Conservatory and were required to have the utmost simplicity with a minimum of automatic controls. In our brilliant sunlight, the Conservatory will sometimes become too hot even for tropical plants and will require conditioned air. Taking advantage of this arid climate, cooling will be accomplished by an evaporative system. Side and ridge air vents will provide ventilation and will be operable manually as well as by motor.

The interior lighting of the Conservatory was designed to provide a level of illumination adequate to see the plants but low enough to maintain a night appearance, the atmosphere of a park, illuminated only by specially designed lamp posts, not too closely spaced.

The general contractor, Gerald H. Phipps, Inc., selected shortly after completion of preliminary drawings, has worked with the architects in determining the most economical method for constructing the conservatory vault. After a thorough investigation of pre-casting and prestressing concrete, it became apparent that the simplest and least costly method would be to pour the concrete in place. It was decided to construct a wooden deck for approximately three-quarters of the entire vault and to attach to it the wood forms for sides and tops of the concrete structural members. The wood forms for the diamonds are reused as the construction progresses.

At this writing, the forms for the end of the building have been removed from the east end and reinstalled at the west end. If the present methodical progress pattern is maintained, the conservatory concrete, spanning 72 feet in width and covering 160 feet in length, will be completed before Christmas, approxi-

mately ten months after work was started on the concrete foundations and buttresses. The complete enclosure of the structure should be achieved early in 1965 and the Contractor expects to complete his work before summer.

The installation of the clear plastic pyramids on each diamond will begin sometime in December, because each diamond in the completed structure must be measured for exact dimensions before the Plexiglas units are manufactured. These glazing domes will be formed to the four-sided pyramid shape from a single piece of Plexiglas for all but the lower two horizontal rows which are too large for available panels and will, of necessity, be formed from two sheets and welded at the intersection.

Concurrent with the vault construction, the mechanical room on the north will be enclosed and filled with the machinery required to provide the Conservatory with a tropical climate; and the observation terrace and lobby on the east will be constructed. The east end will be closed with a temporary entrance wall which will be removed when Horticulture Hall is built. All of those close to the Botanic Gardens are aware of the need for this building and hope its realization may come soon.

Many people were involved in establishing the program for the building and in following it through to com-

pleted drawings; many are still working on developments during the actual construction. The Planning Committee of the Denver Botanic Gardens has been especially hard-working and self-sacrificing, meeting almost weekly with the architects from the beginning of the project to the present time. The Committee is made up of Dr. John Durrance, Mr. John Mitchell, Mrs. James J. Waring and Dr. A. C. Hildreth. Mr. Lawrence Long and Dr. Moras Shubert have frequently joined these meetings.

Working directly with the architects as engineering consultants were Robert S. Nedell, Structural Engineer and his Project Engineer, Eduardo Salse; Marshall and Johnson, Inc., Mechanical Engineers; and Sol Flax, Electrical Engineer. Mr. Thomas Everett of the New York Botanical Garden and Mr. Walter Kelsey, Architect, acted as special consultants. The Ideal Cement Company and the Portland Cement Association provided valuable advice on the structural design details and the composition, color and texture of the concrete; Mr. Edmund Wallace represented the Department of Parks and Recreation; and Gerald H. Phipps, Inc., builder of the Conservatory, advised on costs and methods of erecting the conservatory vault throughout the preparation of the final working drawings and specifications.



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POLLY STEELE

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This hellebore has been known for centuries, yet each year's bloom in snow and severe temperatures seems a miracle.

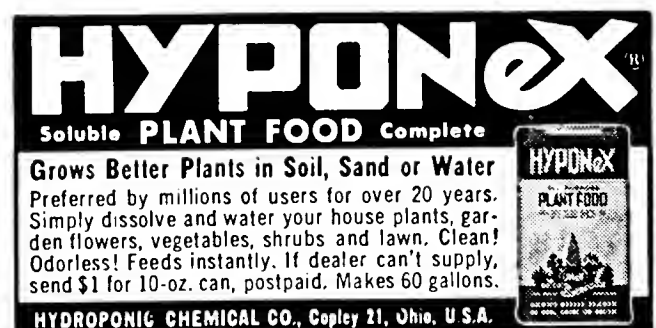
Hellebore niger, the Christmas rose and *Hellebore orientalis*, the Lenten rose, are the best known. Both are culturally simple and, once established, are richly productive in our Denver area.

Carefully select a cool, lightly shaded situation, that is protected from strong winds. The soil should be moist but well drained. A deep plot of good garden loam with leaf mold and sand incorporated is ideal. Once established do not disturb because seldom do hellebores flower the first or even the second year after planting.

The flowers are white when first



opened. As they grow older they assume rose or purple shadings. They measure from 2½ to 3½ inches across. The individual blooms, if properly cared for, are long lasting when cut. Use them in arrangements and corsages. Leaves of this plant are very slow growing. To remove the leaves robs the plant of its ability to flower freely. Use some of the broadleaved evergreens or pines or spruces for arrangements with these beauties.



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IN ITS FOURTH YEAR, the Denver Botanic Gardens Guild continues to better serve the Botanic Gardens through its many successful projects. Our programs this year have also stimulated us further in our quest for horticultural knowledge.

The sale of 1964 gardening calendars was a major money raising project. The sale of these calendars produced a grand profit of \$883.78. This means that "with a little bit of luck" we may start in the spring of 1965 to develop the formal herb garden which will be situated in the York Street Unit. We have an estimate that materials and labor will cost \$1,900.00.

Again this year the Guild actively participated in the Colorado Garden and Home Show, which is sponsored by the Botanic Gardens. Our group, at the request of Mr. Richard Haughton, General Manager and Mr. George Kelly, Designer, planted and maintained one of the gardens. Some of our members also served as hostesses at the press party on the opening day of the Show.

Although we turned down a request to be fully responsible for the Annual Plant Sale, members of the Guild planned and worked with vigor to make the 1964 Sale a huge success. Our group was again responsible for the Herb Booth. We sold 38½ dozen plants

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of Denver Botanic Gardens

which were grown in the herb garden located in the York Street Unit; 2,135 plants which were purchased from nurseries; 25 herb charts; five mortar and pestles and four potpourri. We proudly contributed a net profit of \$595.60 to the Botanic Gardens' general operating fund.

In July the Guild, along with The

The Denver Botanic Gardens Guild Annual Report 1963-1964

MARCIA MACDOUGALL
President

Garden Club of Denver and The Perennial Garden Club, sponsored the 1964 Terrace and Garden Tours. Each Guild member was responsible for selling five tickets at \$2.50 each and acted as a hostess at one of the beautiful gardens.

Programs which were presented to our group this year included a tour of Botanic Gardens House with Mrs. Helen Vincent and a tour of the York Street Unit garden with Mr. Joseph W. Oppe; Dr. Helen Marsh Zeiner, with the aid of colored slides, identified for us many types of house plants and the care needed to keep them hearty and healthful; Mr. George Fukuma gave us the history and kinds of bonsai and demonstrated how to grow a cascade bonsai. Mrs. Ralph Ball explained the three methods for drying flowers and gave us a list of flowers and the methods most often used to dry each successfully; Mrs. J. V. Petersen showed us her colored slides to illustrate plan-

ning, locating and planting a rock garden and described the plants best suited for this type of garden; Mrs. J. L. Janosky spoke on herbs just before the Annual Plant Sale to prepare us for our job of selling herbs. Two meetings were devoted to flower arranging: Mrs. Glenn Clayton discussed the fundamentals of flower arranging and Mrs. Edmund Wallace judged arrangements we made ourselves.

Other assistance given to the Botanic Gardens included: hostessing, along with members of the Denver Botanic

Gardens Board of Trustees, a box supper for Mayor Tom Currigan and his staff; making evergreen garlands which added a festive mood to the Botanic Gardens House at Christmas time; and volunteering time to help maintain the various plant collections.

This has been an exciting year. We have had an opportunity to get better acquainted with the many facets of Denver Botanic Gardens; to understand how vital each is to this successful and rapidly expanding organization of which we are proudly a part.

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BOOK REVIEW

DR. HELEN
MARSH ZEINER

TREE LOVERS will be pleased to know that a revised edition of *Knowing Your Trees* by Collingwood and Brush has recently been brought out by the American Forestry Association, 919 Seventeenth St., N.W., Washington, D. C.

This book first appeared in 1937 and was at that time a very welcome addition to the literature on trees. Since then, it has undergone several revisions and numerous printings. The 1964 edition, the 19th, has been greatly expanded and improved and is worthy of a place in the library of any tree-minded gardener.

The book has 900 illustrations, including actual photographs of each tree (in both summer and winter condition for deciduous trees), the bark, the flowers and the fruit. These photographs are wonderful aids to identification. A map of the natural range of each tree is given.

A total of 170 different trees are covered, including some of our Colorado natives. The trees are representative of various areas of the United States, so that almost any section of the

country has at least one representative tree included. Many of these trees are commonly planted as street trees or specimen trees in our area.

Two pages are devoted to each tree. In addition to the very useful illustrations, there is a well-written and interesting discussion of each tree. Botanical features, ranges and habitats, economic uses and bits of information of general interest are included. The scientific name and several common names for each tree are given. A feature that will appeal to many is that the meaning of the scientific name is explained.

Hardiness zones for each tree are suggested. This should be a useful guide in selecting trees for use in any area.

If you are interested in a book for Christmas giving, consider *Knowing Your Trees*. Not only is the information adequate and reliable but the book has eye appeal from the attractive jacket right through its well-illustrated pages. You will also find that for a book of its general excellence, the price is reasonable.

LEE CHAMBERS

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Up to this time the Denver Botanic Gardens has operated with only a limited number of volunteers to assist the four staff members and three maintenance men. With the opening of the conservatory and operating greenhouses scheduled for next year, it has become obvious that a large organization is needed to cope with the increasing activities.

Therefore, a **new volunteer organization — Associates of Denver Botanic Gardens — is being formed.** Membership will be open to any man or woman who is interested in the Gardens and wishes to help. Dependable workers are needed for the following activities: 1) to groom the plantings in the Gardens, 2) to guide tours through the various units of the Gardens, 3) to act as hostesses in the House, 4) to assist in the Library, Herbarium, and proposed gift shop, 5) to help with educational programs, 6) to help with stenographic and clerical work, labeling, mapping, and flower arrangements. More information can be obtained at Botanic Gardens House — or you can phone for registration or fill out the membership blank on the following page. Manager of the Associates is Mrs. Chard Smith, Jr. (756-1327), Assistant Manager is Mrs. Graham Morrison (424-0706).

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